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The Oil Man's Calendar

APR.	
3-7	**American Chemical Society, Baltimore, Maryland.**
4-5	**Eastern District A.P.I. Division of Production, Pittsburgh, Pa.**
11	**Pacific Coast District A.P.I. Division of Production, Los Angeles.**
13-14	**National Petroleum Association, Cleveland, Ohio.**
18-19	**Mid-Continent District, American Petroleum Institute Division of Production, Oklahoma City.**
18-20	**Southwest Gas Measuring Short Course, Norman, Oklahoma.**
24-29	**Oil-World Exposition, Houston, Texas.**
MAY	
3-5	**Petroleum Electric Supply Association, Houston, Texas.**
3-5	**Petroleum Industry Electrical Association, Houston, Texas.**
3-5	**Natural Gasoline Association of America, Tulsa, Oklahoma.**
9-11	**American Institute of Chemical Engineers, Akron, Ohio.**
15-18	**American Petroleum Institute, Mid-Year Meeting, New Orleans, Louisiana.**
18-20	**National Oil Scouts Association, Houston, Texas.**
21-25	**National Association of Purchasing Agents, San Francisco.**
JUNE	
3	**Illinois-Indiana Petroleum Association, Robinson, Illinois.**
15-16	**Pennsylvania Grade Crude Oil Association, Hershey, Pa.**
AUG.	
1-6	**The Eastern United States Michigan Oil & Gas Exposition, Mt. Pleasant, Michigan.**

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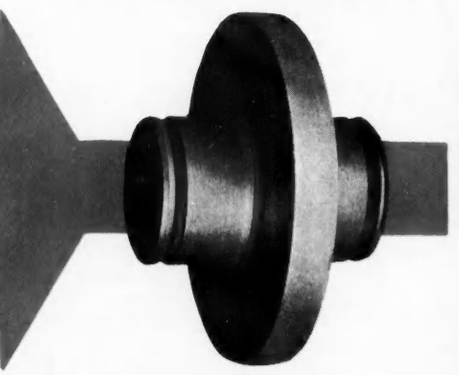

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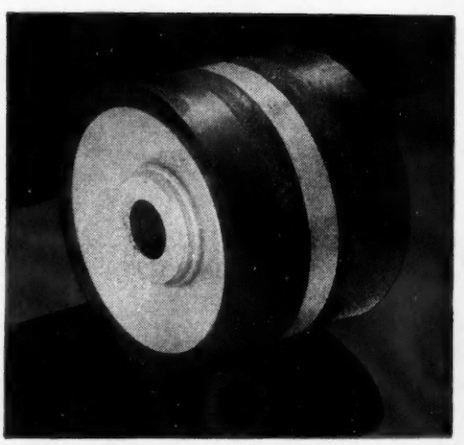

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Editorial . . .

No Basis for New Texas Order

ACTING contrariwise to every bit of evidence offered by the oil industry and economists, including government economists, and acting contrariwise to every request on the part of Texas operators that the production of the state not be increased in April, the Texas Railroad Commission has promulgated an order for 30 days which, by lifting Saturday shutdowns throughout the state will throw onto the market a surplus amount of crude oil which could easily break that market.

The only saving grace of the commission's order is that it was for 30 days and that a state-wide hearing has been set for April 19 at which time another look into the situation will be taken.

While some East Texas producers were clamorous for the lifting of the Saturday and Sunday shutdown in East Texas, to be accomplished at the expense of other areas, no one appearing before the commission urged that production be increased beyond the point recommended by the economists. It has been intimated that the action of the commission is in the nature of a threat to other states where production of oil is either not regulated or little regulated, but we should like to point out to the members of the Texas Railroad Commission that they are playing with fire and that the idea that they should fight Illinois and Louisiana oil to the last penny of the Texas producer reflects no great credit on their mentality.

Heavy purchasers of Texas oil have expressed the fear that the railroad commission in April may again promulgate an order which will result in a continued surplus of crude, and say that they do not see how the market can stand such a strain.

We do not believe that the large purchasers of Texas oil desire to cut the price, but it is obvious that they do not intend to store oil in the face of a probable decline in price.

The net effect of the order might easily be pipe line proration, the commission simply passing the buck on to the producers. Pipe line proration almost invariably leads to a reduction in the price, and those who may feel that the commission was acting in a friendly manner to them by raising Saturday shutdowns may well find that it has, unintentionally, perhaps, played them a dirty trick.

This is the first instance in a long time in which the Texas Railroad Commission has deliberately placed the set allowable above the figure recommended by the United States Bureau of Mines. And the Texas Railroad Commission, by its disregarding the Bureau of Mines recommendations cannot well complain of actions by states which are not members of the Interstate Oil Compact.

The important question to Texas producers, however, is: Will the crude oil market stand the strain of 30 days of surplus production? Maybe it will—we hope so—but we are fearful that it may not.

Why This Heckling?

AT THE Texas Railroad Commission hearing at Austin last week we heard a good many witnesses asked as to the amount of oil being brought into Texas from other states by their companies. There seemed to be an idea on the part of some that an oil company could be put on the spot for bringing crude oil into Texas to be refined.

If the State of Texas had the right to force oil companies to discontinue bringing oil into Texas, and did so, it would not aid a single Texas producer.

We realize fully that Texas producers have made sacrifices on proration which very few other states have made and that they can well be riled at what they term "holding the umbrella over other states" but if the flow of Louisiana and New Mexico oil into Texas were stopped by law (which law cannot be passed) the net result would be an increase of refining capacities in New Mexico and Louisiana—and it does not take a great deal of studying to see that.

If less time at the Texas Railroad Commission hearings were taken in heckling witnesses and in trying to make them say things which they do not intend to say, if reputable economists from other states were not made to appear as proceeding from every ulterior motive, then maybe the commission's own eyes would not be blinded by the dust which it allows to be created.

Larger Runs Cause Gain In Gasoline Stocks

REFINERS apparently are becoming less cautious than in recent weeks in turning out finished products, and there is some danger that the closing weeks of the fall-winter season may bring over-refining and some eleventh hour overbuilding of gasoline inventories.

Stocks Reach 87,000,000

In the week ended March 18 crude runs to refinery stills were 45,000 barrels a day greater than in the previous week, and the industry added approximately a million barrels of gasoline to storage, as it had done the week before, expanding total stocks of finished and unfinished gasoline to 87,291,000 barrels.

Economists have estimated that a gasoline inventory of about 80,000,000 barrels would be sufficient on entering the spring-summer season March 31. Consequently, the industry had about 7,000,000 barrels of surplus gasoline on hand March 18.

If the additions of around a million barrels weekly in recent weeks should be continued during the remainder of the month, the inventory on March 31 would be approximately 89,000,000 barrels, which would embody an indicated surplus of about 9,000,000 barrels.

Lower Than Year Ago

The outlook is better than it was last spring, when gasoline stocks reached an all time peak of 93,192,000 barrels in the week ended March 19; for the inventory probably will be held this year several million barrels below last year's high, while gasoline demand is running about 5 percent larger this year than last year.

Nevertheless, the prospective surplus of about 9,000,000 barrels for March 31, this year, is cause for some concern; and because of it, there will be need for continued strict watch over inventory fluctuations in coming months and for special efforts to restrict refinery runs sufficiently to achieve lower and more desirable levels of gasoline stocks.

Excess Burdens Market

For unless the present surplus is worked off during the spring and summer, it will remain as a burden on the markets next fall and winter.

The weak markets and depressed prices of the oil industry, particularly with regard to gasoline, represent impressive evidence of the ill effects of failure to hold gasoline inventories at economic levels. The surplus gasoline that the industry held at the beginning of spring last year undoubtedly was largely responsible for the low prices of gasoline that prevailed throughout the year and still prevail. Moreover, the low gasoline prices were partially responsible for the decline of crude prices in October of last year.

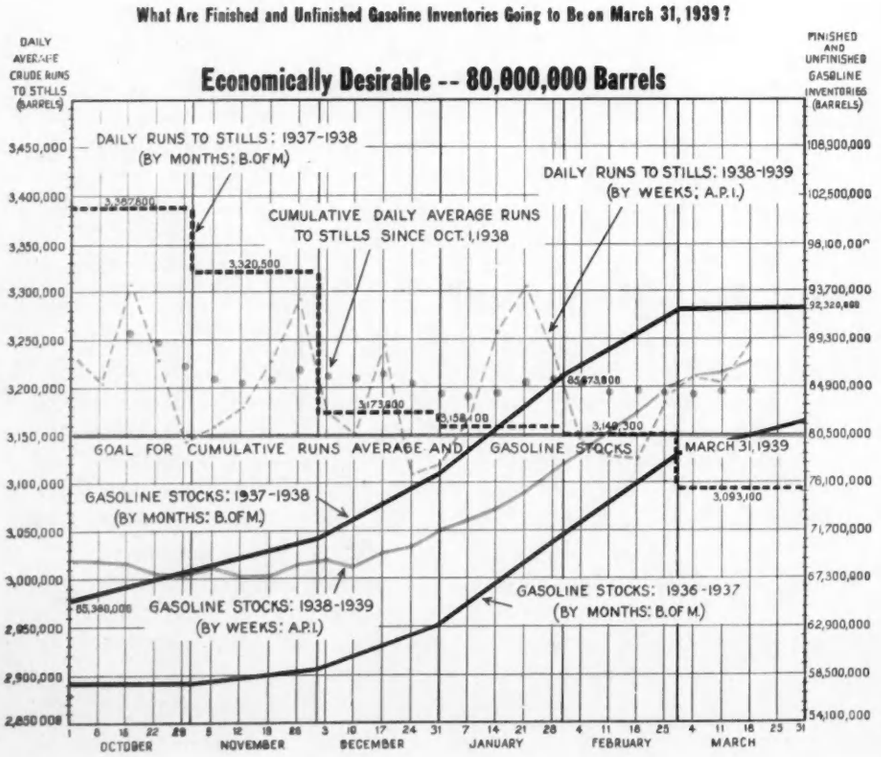
Crude runs to stills averaged 3,250,000 barrels daily in the week ended March 18, having been increased 45,000 barrels over the rate in the previous week.

Total stocks of gasoline, finished and unfinished, increased nearly 1,000,000 barrels, to a new total of 87,291,000 barrels.

Cumulative refinery runs since October 1 have averaged 3,199,375 barrels daily, through March 18.

The accompanying chart shows the trends of refinery runs and the attendant fluctuations of gasoline stocks during the present fall-winter season.

What Are Finished and Unfinished Gasoline Inventories Going to Be on March 31, 1939?



Surplus Oil May Nullify Gain From Better Demand

By L. J. LOGAN, Associate Editor

UNTIL the middle of last week, when the Texas Railroad Commisson announced that Saturday shutdowns of all Texas oil fields would be lifted in April, the petroleum industry's outlook appeared moderately promising, despite some unfavorable factors in the general business situation and within the industry.

The announcement of the new program for Texas proration was, however, seriously disturbing. Under the Saturday and Sunday shutdowns which have prevailed heretofore, production was approximately in balance with market demand. And increases in demand were being largely fulfilled by the completion of new wells, which were gradually expanding the state allowable. The production added by lifting the lid on Saturdays will be largely surplus oil, which will act as a burden on already weak markets.

Surplus Crude Faced

It appears certain that considerable crude will be forced into storage in April, and the surplus crude likely will tend to cause excessive refinery runs and production of additional surplus gasoline, although gasoline stocks already are about 10 percent larger than economically desirable.

It is quite possible, moreover, that some purchasers will decline to buy all the production permitted under the new program. In such cases, pipe line proration of purchases would be necessary, and pipe line proration inevitably leads to the offering of oil at distress prices.

The outlook has been seriously clouded, therefore, by the liberalizing of Texas allowables.

Scheduled Hearing Offers Hope

Fortunately, however, the Texas Railroad Commission has scheduled a hearing at Austin April 19, at which it will again consider allowables. And if it is found in the meantime that Saturday production is not satisfactory, shutdowns for two days a week may be ordered again.

For several years, Texas production has been held consistently in line with market requirements, and this fact has given the industry hope that the state will continue to exercise reasonable control over its output.

The present situation is disturbing, but there is hope that the railroad commission will not permit any protracted overproduction, which would result in a collapse of the markets and a break-down of the price structure.

Business Holding Gains

Although business activity continues less vigorous than several months ago, it remains materially better than a year ago; and there are some expectations of improvement in the second and third quarters.

At the same time, it is recognized that the European situation is not economically favorable; that Europe probably faces a prolonged period of tension, during which economic as well as political relations between opposing groups will be strained; that world trade likely will be affected adversely.

In the United States, the broad business gains of the latter half of 1938 are being held fairly well, although the recovery movement has slowed down appreciably in recent months.

Automobile production is running about 50 percent higher than last year, and consumption of rubber by manufacturers is up even more. Coal production is about 15 percent greater than it was last year. Electric power production is up 11 percent. Production of shoes has been about 25 percent larger this year than last year. Steel mills ran at about 56 percent of capacity in the week ended March 20, compared with 33 percent in the corresponding week last year.

Activity continues large in the construction and allied lines. Total construction of all types was 85

Bureau of Mines Forecast of Demand for April Is Optimistic

(Barrels)

MONTH	Total Demand for Domestic Crude	MOTOR FUEL DEMAND		
		Domestic	Export	Total
November, 1938:				
November, 1938, forecast	101,740,000	42,700,000	3,800,000	46,500,000
November, 1937, actual	107,264,000	42,666,000	3,309,000	45,975,000
Change from year ago	−5.5%	−0.1%	+14.8%	+1.1%
December:				
December, 1938, forecast	102,480,000	40,100,000	3,300,000	43,400,000
December, 1937, actual	106,921,000	39,465,000	2,442,000	41,907,000
Change from year ago	−4.2%	+1.6%	+35.1%	+3.6%
January, 1939:				
January, 1939, forecast	101,390,000	36,230,000	3,400,000	39,630,000
January, 1938, actual	104,619,000	35,176,000	3,090,000	38,266,000
Change from year ago	−3.1%	+3%	+10%	+3.6%
February:				
February, 1939, forecast	90,160,000	33,400,000	3,400,000	36,800,000
February, 1938, actual	93,734,000	31,861,000	3,931,000	35,792,000
Change from year ago	−3.7%	+4.9%	−13.5%	+2.8%
March:				
March, 1939, forecast	103,540,000	42,950,000	4,000,000	46,950,000
March, 1938, actual	103,273,000	41,259,000	3,562,000	44,821,000
Change from year ago	+0.2%	+4.0%	+10.9%	+4.7%
April:				
April, 1939, forecast	103,020,000	46,300,000	4,300,000	50,600,000
April, 1938, actual	103,732,000	43,254,000	4,474,000	47,728,000
Change from year ago	−0.7%	+7.1%	−3.7%	+6.0%

percent greater in February, 1939, than in February, 1938. Residential building in February was double that in February last year and at the highest level for that month in 10 years. Permits for residential construction in 1938 were 14 percent greater than in 1937 and the largest for any year since 1930. Lumber production in the first 2 months of 1939 was 24 percent greater than in the corresponding period of 1938; shipments were up 14 percent; and new orders were up 4 percent. Shipments and production of cement are running well ahead of last year. Plate glass production in the first 2 months of this year was nearly three times as large as in the similar period last year. Machine tool orders are double those a year ago, reflecting increased interest in new machinery.

Commerce is showing up favorably in comparison with a year ago. Freight car loadings in the week ended March 11 were about 6 percent greater than in the corresponding week of last year. Department store sales are running about 2 percent higher than a year ago. Retail sales in rural districts and small towns are 10 percent above a year ago and the best since 1929.

Commodity prices remain an unfavorable factor, being about 8 percent lower than at this time last year.

Stock market prices continue steady and are more than 20 percent higher than a year ago.

Forecast Is Encouraging

Encouraging was the business forecast made recently by the Bureau of Agricultural Economics, which has a reputation for exceptional accuracy in prognostication.

The bureau forecast a somewhat greater than seasonal rise in business activity in the spring and summer of this year.

It stated that an anticipated further increase in building operations and some additional increase in government expenditures should furnish the stimulus for an upturn.

The bureau added, however, that it seemed unlikely that there would be any marked increase in the total volume of industrial production.

It declared that the critical time would come when the impetus furnished by construction and government spending was reduced.

The opinion was expressed that failure of private capital to increase its investment might lead to another recession in the latter part of this year or the first part of 1940.

"On the other hand," continued the report, "if private expenditures for producers' or capital goods gradually increase, the anticipated spring and summer rise could be the forerunner of a period of gradual improvement extending into 1940 at least."

Oil Demand Good

The oil industry outlook is especially hopeful in so far as demand for petroleum is concerned. Consumption has been exceeding most expectations in the past several months, and present prospects are distinctly promising.

Particularly encouraging is the fact that demand has broadened to embrace gains for nearly all products, including the heavy, industrial fuel oils and industrial lubricants, which were consumed in reduced quantities in 1938, because of curtailed industrial activity.

Currently, nearly all petroleum products are being used more widely than they were a year ago.

April Forecast Hopeful

The Bureau of Mines always is conservative in making its monthly forecasts of petroleum demand, and consequently the bureau's estimates for April are especially encouraging, being comparatively high.

The total demand for motor fuel in April was estimated 6 percent greater than the actual demand in April of last year, despite the expectation of 3.7 percent smaller exports, as domestic consumption was expected to be 7.1 percent larger than in April, 1938.

The bureau explained that a part of the expected increase could be attributed to a slightly subnormal demand a year ago, but that the principal cause rested in improved business conditions, combined with the upward trend in motor fuel demand per motor vehicle.

January Demand High

The latest official figures on actual consumption, covering January, reflected noteworthy improvement over a year previously. Total demand for United States petroleum was 7.6 percent greater in January, 1939, than in January, 1938.

This improvement occurred in the face of relatively small export business, the shipments of crude oil to foreign countries having been 24.7 percent smaller in January, 1939, than in January, 1938, although exports of refined products were up 6.3 percent.

The total domestic demand for petroleum products was 10.5 percent greater in January, 1939, than in January, 1938. The domestic demand for gasoline was 7.6 percent larger than in January of last year, that for kerosene was up 11.6 percent, and other gains included those of 24.5 percent for gas oil and distillate fuels (the light oils used chiefly for heating), 14 percent for residual fuel oils (the heavy oils used primarily for industrial fuels), 9.4 percent for lubricants, 14.6 percent for road oil, and 2.9 percent for still gas. The several products for which demand was lower in January, 1939, than in January, 1938, included: wax, used 35.6 percent less extensively; coke, in ½ of 1 percent smaller demand; and asphalt, required in 1.4 percent smaller quantity.

Demand for Petroleum Products Materially Better in January, 1939, Than in January, 1938

(Barrels)

	January, 1937	January, 1938	January, 1939	Percent Change from Year Ago
Total demand	104,077,000	103,414,000	111,889,000	+ 7.6
Daily average	3,357,000	3,336,000	3,609,000	+ 7.6
Exports:*				
Crude petroleum	3,596,000	5,953,000	4,477,000	−24.7
Refined products	8,157,000	7,988,000	8,491,000	+ 6.3
Domestic demand:				
Motor fuel	33,668,000	35,176,000	37,847,000	+ 7.6
Kerosene	5,286,000	5,360,000	5,980,000	+11.6
Gas oil and distillate fuels	14,847,000	12,642,000	15,742,000	+24.5
Residual fuel oils	28,116,000	25,844,000	29,484,000	+14.0
Lubricants	1,625,000	1,471,000	1,609,000	+ 9.4
Wax	106,000	115,000	74,000	−35.6
Coke	520,000	535,000	532,000	− 0.5
Asphalt	760,000	1,077,000	1,062,000	− 1.4
Road oil	226,000	151,000	173,000	+14.6
Still gas	4,864,000	4,937,000	5,081,000	+ 2.9
Miscellaneous	157,000	137,000	173,000	+26.3
Losses	2,149,000	2,028,000	1,164,000	−42.6
Total domestic demand	92,324,000	89,473,000	98,921,000	+10.5
Daily average	2,978,000	2,886,000	3,191,000	+10.5

* Imports of crude as reported to Bureau of Mines; all other imports and exports from Bureau of Foreign and Domestic Commerce.

Well Completion Data

By S. F. BOWLBY,
Shell Petroleum Corporation,
Houston, Texas

STATING that modern technique and equipment have enabled the oil man to attempt completions which a few years ago would have been impossible, particularly on account of the greater depths to which exploration is now carried, as well as the types of reservoirs which are encountered, the author presents the types of data which are required for the most economical development of a field according to the most recent advances in technique and illustrates the manner in which such data may be recorded graphically in order that they may have the greatest utility. In the keeping of records and the assembling of data, usability should be the keynote in all instances.

This paper was presented at the Spring Meeting of the Southwestern District, American Petroleum Institute Division of Production, San Antonio, Texas, March 16, 1939. The statements and opinions expresssed herein are those of the author, and should not be construed as an official action or opinion of the Institute, nor of this publication.

IN recent years improvements in drilling and completion technique, as well as the introduction of electrical measuring devices, have placed at the disposal of the oil industry a set of tools which require appreciable correlation and accuracy in order to be of maximum use and profit, more so because of the conditions of greater depths to which exploration and exploitation are now being carried. Furthermore, stringent curtailment of production tends to obliterate and cover up errors which are sometimes made in completion practice in spite of the most skillful engineering technique, and it is not until large investments have been made that such errors become evident.

In the Gulf Coast area in particular the difficulties inherent to greater depths are further complicated by the fact that oil is found to saturate only a comparatively thin section of a sand body, is overlain almost completely by gas and underlain by water on all points of the accumulation. These thin oil columns, as they are often called, require special attention, because even if it is possible for an operator to develop his properties which are embraced by such a reservoir on a wide-spacing pattern, the completion technique should be such that the maximum drainage, both vertical and lateral, may be obtained. Had development problems of this nature arisen a few years ago before the present refinements in measuring devices and completion practice had been adopted, the chances of success would have been negligible, as it is evident that it is no longer possible to drill a well into such a reservoir and produce it by rule-of-thumb practices of long standing. Even though such practices still maintain in ordinary cases, the modern operator will only complete wells under the difficult conditions mentioned after he has taken full advantage of the help offered by modern science.

A better understanding of the reservoir and its contents, obtained through early and detailed observations and proper interpretation, has made it possible to take immediate action in determining the best completion procedure. Although considerable improvement still can be made in the accuracy of determinations of the content of reservoirs, present technique has made it possible to obtain reliable figures for the amount of oil in place and has shown that appreciable quantities of water are present in the void space of most oil-bearing formations. As a consequence, it is now anticipated that the improved methods of completion and production will recover a far greater percentage of the oil underground than formerly estimated. This is particularly true with regard to the exploitation of high-pressure gas-distillate zones, where, if proper action is taken without delay, it is possible to recover and save close to 100 percent of all hydrocarbons present, thereby utilizing natural resources to the fullest extent.

It follows that a standardized procedure for taking and recording data should be developed in each field, but it is also evident that no stringent rules can be laid down as to the amount and nature of the data to be assembled and preserved, as this will vary considerably with the conditions encountered. In determining the nature of the data to be obtained early in the development of a field, experience is of first importance, and the collection of such data should be under the immediate direction of a personnel of broad training even though the collection of this data has in recent years become somewhat of a routine procedure.

It is in this direction that the following summary of data, which can be collected and the manner in which they may be preserved, has been prepared.

Generally speaking, records may be of two kinds, firstly, the written record providing the historical background and including all minor details in the drilling of a well, and secondly, the graphic record, of which the well logs and cross-sections are examples, which have, however, undergone considerable change and improvement on account of the advanced technique and greater variety of physical constants measured and recorded thereon. While the written record is necessary to provide all of the details concerning a well, nevertheless it is of limited value for comparative study and coordination of data in undertaking difficult completions, and in this instance graphic records are indispensable.

In discussing well completion data, it will be assumed that all of the details as to geologic correla-

tion, such as paleontology and structural correlation in connection with the use of the electrical log, have already been undertaken, and the reader is familiar with the graphic formation symbols used in the illustrations. The primary considerations, therefore, hinge about (a) data necessary before the actual mechanical completion can be determined, which, for reference, will be called "Basic Completion Data." These data are also meant to include such information as is necessary to determine well density required, and in general all factors which may influence the development of the particular structure. (b) "Actual Completion Data" pertaining to the mechanical details, and (c) "Performance Data" which, of course, are proof of the conclusions reached under (a) and (b).

Basic Completion Data

The necessity of accurately locating any subsurface point in a well, as well as the degree of accuracy of the various means of obtaining depth measurements, has recently been discussed at some length in a paper by C. E. Reistle, Jr., and S. T. Sikes, Jr., entitled "Well Depth Measurements," dated May 25, 1938.[1] Of all of the basic data which are necessary to effecting a satisfactory completion, particularly the selective completions which are now being undertaken, accurate measurements are probably the most important. The importance of proper measurements is fully recognized when one considers the attention that mechanical depth measuring devices are receiving. It is the writer's opinion that even though mechanical devices for recording depth are, on the whole, largely satisfactory, nevertheless the drill-pipe and sand-line measurements still should be regarded as the standard of comparison, since conditions beyond the control of the operator make it possible to err when using mechanical devices.

In indicating measurements on the graphic record, as well as in the written record, the maximum amount of possible error should be apparent at once, for example on Figure 1 the possible discrepancy of the depth at which the electric log was run and the electric log depth measurement itself are shown.

Until recently it has been necessary in order to obtain the character and content of the formations penetrated to take formation cores with the so-called "conventional" core barrel which is attached to the drill stem and necessitates a round trip each time a core of a maximum length, seldom exceeding 20 feet, is taken. Such procedure is and always was costly. The steadily increasing depth to which wells, particularly exploratory wells, are now drilled confronts the engineer or geologist seeking information with ever-mounting cost of obtaining conventional cores. This cost factor, recognized at a rather early date, in turn has led to the development and general adoption of wire-line core barrels and practices, until at this time wire-line coring has in many instances entirely replaced the old time conventional core.

Second only to accurate measurements in basic well completion data, core analyses play an important part in the essential information to be assembled, and, as will be seen, the graphic presentation of such data is of equal importance.

It has been general practice until quite recently to examine a core at the surface for its appearance, either cut, smell and taste, and subsequently for paleontological information. It has become evident, however, that in limiting core examinations solely to these superficial points the operator is not obtaining the maximum information from the money which has been spent in coring, which even with the general adoption of wire-line coring practices, is still a rather costly procedure when compared with drilling. Appreciably more data on cores became available when those which contained some evidence of petroleum were canned in air-tight containers and forwarded to a distant laboratory for complete analysis. At present, the utilization of laboratories brought directly to the well makes it possible to make use of these data without any delay. However, since the costs of coring in any case are still important factors in drilling costs, there is a growing tendency to rely on the electrical log with its recent improvements in lieu of coring, and in case of doubt as to the contents of the horizon penetrated, rely on cores taken from the walls of the hole with devices which are now available. Though the idea of side-wall coring in itself is not new, the devices by which such cores may be taken and particularly the technique of operation has improved to a considerable degree.

With the growing use of core analyses in basic completion data, as well as a factor in forecasting the performance of the reservoir itself, attention is drawn to the physical constants in a core which may be analyzed with accuracy. Foremost among these are, of course, permeability and porosity, the latter determining the maximum amount of void space that hydrocarbons can occupy in a unit volume of formation; permeability indicating the resistance to extraction of oil if not having a direct influence on

[1] Presented at the Mid-year Meeting of the American Petroleum Institute, Wichita, Kansas, May, 1938.

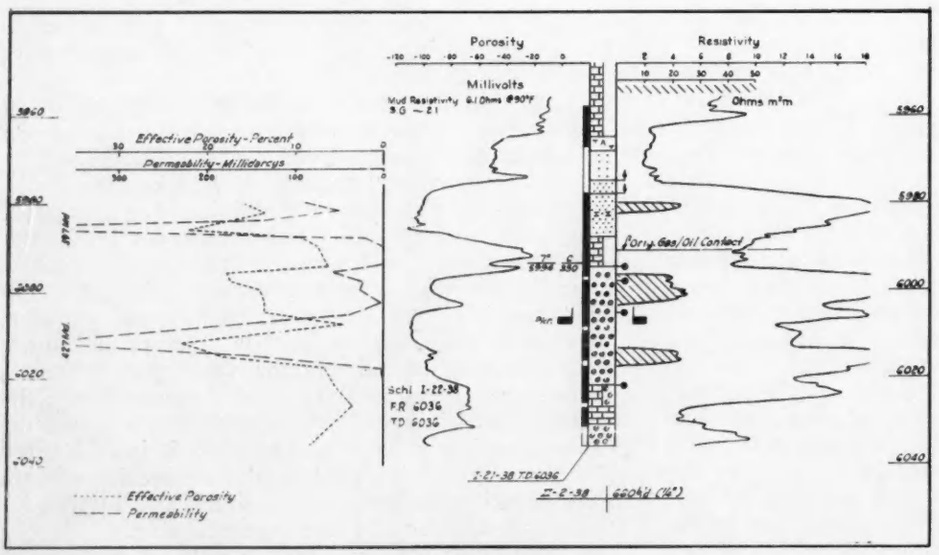


FIGURE 1
Completion Record—Limestone Reservoir

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the degree of saturation of the oil-bearing formations. Aside from these two main points in core analysis, the other major ones may be enumerated as follows: oil saturation, water saturation, chloride content, solubility in HCl, grain size and colloidal content. Any one or all of the foregoing analyses to which cores lend themselves may become of first importance, depending upon the problem under consideration, and since electric logging is affected by these constants also, they are of certain use as an aid in interpreting the electric log. Any or all of these points also lend themselves to graphic presentation.

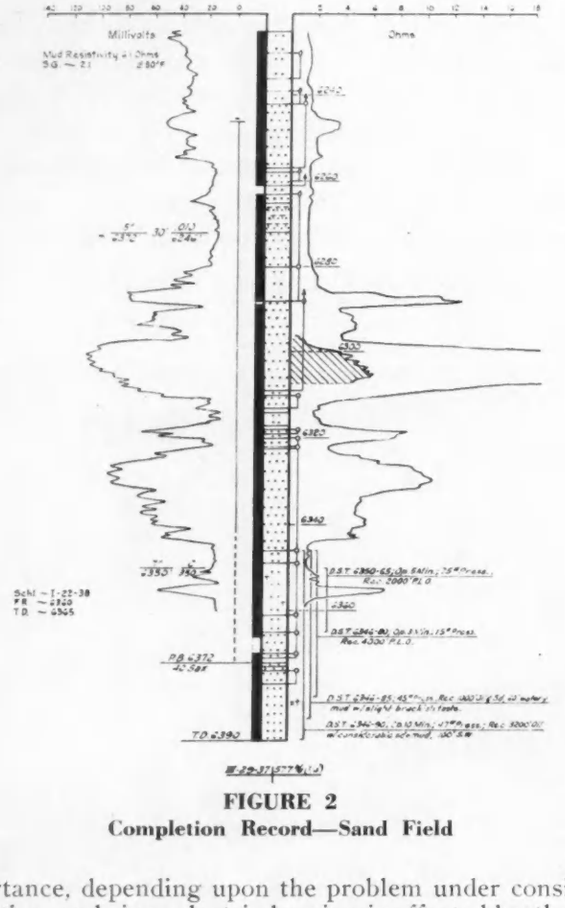

FIGURE 2
Completion Record—Sand Field

Advances are constantly being made in core analysis technique, and at least one private laboratory operating on a service basis contends that through comparison in a great number of cases it is now able to forecast with some degree of accuracy the gas-oil ratio of a particular well and possibly the productivity index as well. Several operators are attempting to make analyses upon fragmentary drill cuttings although such work as yet appears to be inconclusive. At the risk of unnecessary repetition, it should be stressed that unless cores are subject to some sort of analysis other than those of a superficial nature, an operator is not receiving the most for his money.

A method of indicating the cored interval and core recovery itself is shown on the left-hand side of the graphic log, illustrated in Figure 1, as well as some of the other illustrations accompanying this paper. In this method, the recovered portion is shown solid, while the non-recovered portion is left blank. This manner of recording, when accompanied by the indicated content shown best in Figure 2 on the right-hand side of the log, gives a ready reference of basic core data to be used in formulating actual completions. Particularly in limestone reservoirs where porosity and permeability vary considerably over a short vertical interval, it is frequently desirable to include with the graphic log a permeability profile (refer Figure 1) as a distinct aid in a selective completion and further as an aid in correlating "pay streaks" within the reservoir.

The electric log is now used in the majority of areas where exploitation or exploration is carried on, except in those areas where it is either non-diagnostic due to peculiar local conditions or is not recognized as an economic necessity. Rather recent developments in electrical logging have increased its value appreciably so that its use not only made possible a considerable advance in completion technique, but in drilling practice itself through facilitating the adoption of "slim hole" drilling methods.

While there is a vast amount of quantitative as well as qualitative research work yet to be done in electric logging, nevertheless the improvements, especially in connection with the lateral investigation diagrams, commonly known as the "third" and "fourth" curves, have materially aided in the difficult completions which are now being undertaken, and in many instances it is entirely through the able assistance of such devices that these completions may be effected.

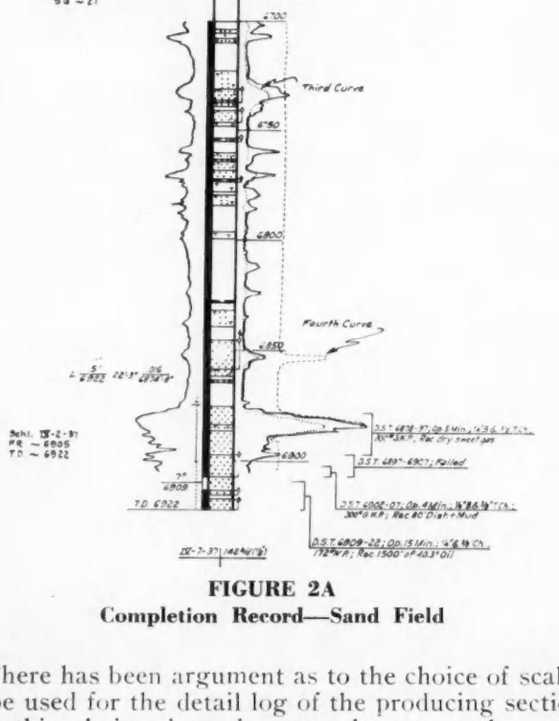

FIGURE 2A
Completion Record—Sand Field

There has been argument as to the choice of scales to be used for the detail log of the producing section and this choice depends somewhat upon the scale of the overall electric log itself. Since its inception, the electric log has been furnished the operator on a scale of 1:100, and as these logs have been used primarily for geological correlation, this scale would seem to be entirely satisfactory. However, it is too small a scale for detailed study of the producing interval. Since this is true, the producing section must be logged on a larger scale, and it is the writer's opinion that a scale of 1:20 has the greatest utility with regard to basic completion data. This scale will, in many instances, enable a correlation within the

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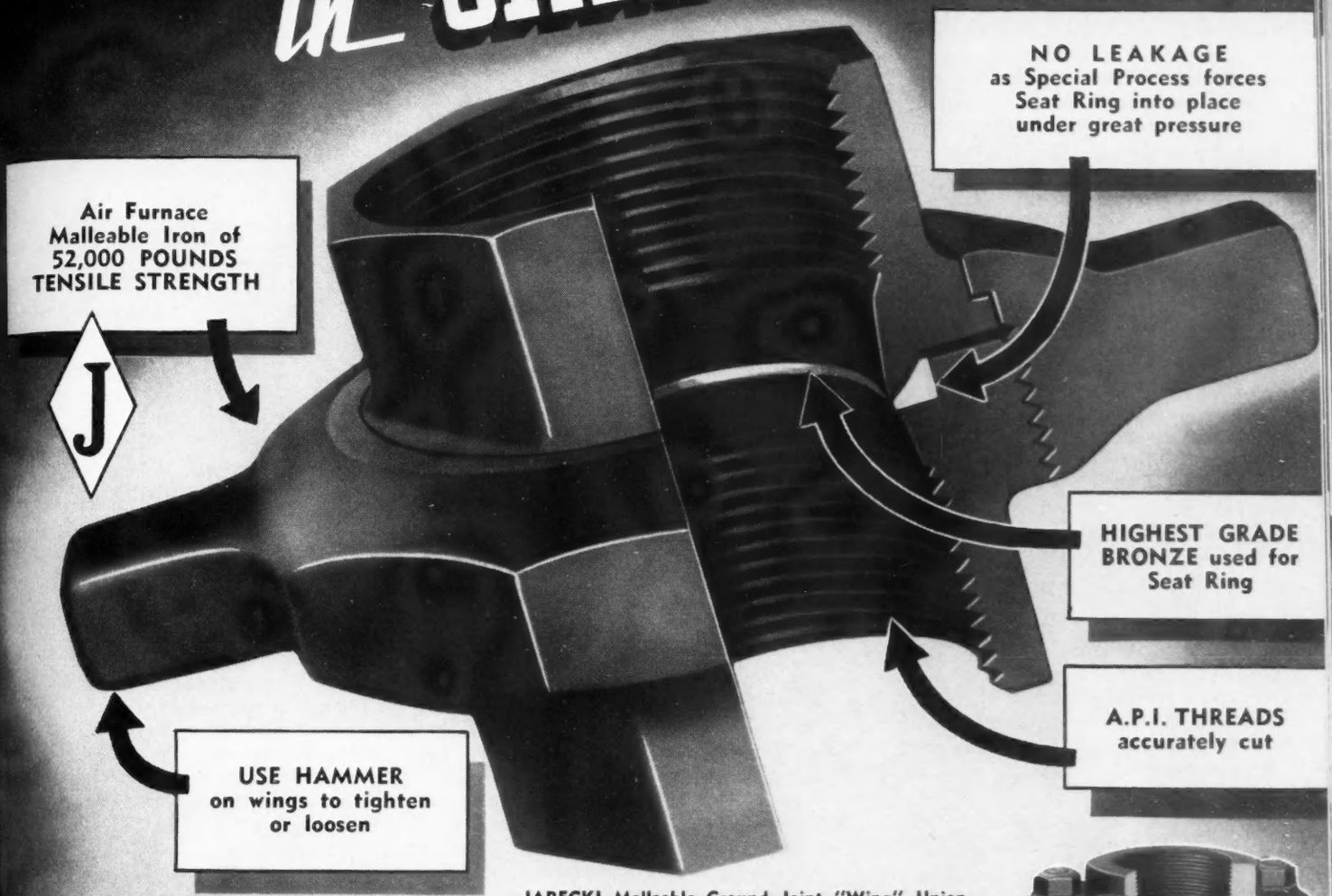
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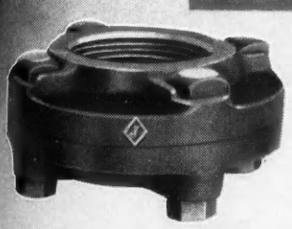

Figure 108—Standard Cast Iron Flange Union

Figure 334—Extra Heavy Bronze Ground Joint Union

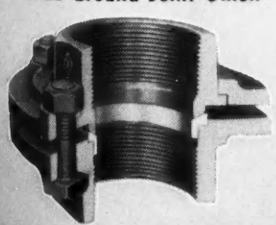

Figure 1847—Three-Piece Standard Malleable Ground Joint Union

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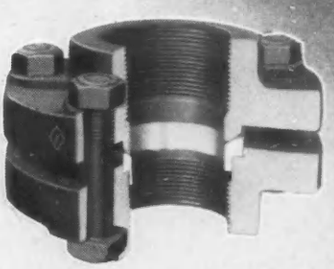

Figure 1896—Extra Heavy Malleable Hydraulic Ground Joint Union

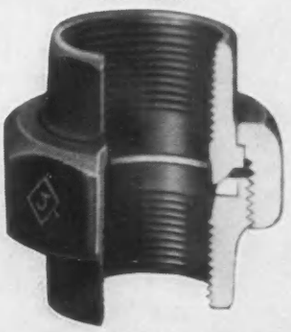

Figure 101-A—Jarco Heavy Malleable Ground Joint Union

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producing section itself, thereby giving a better understanding to reservoir anomalies. For example, thin impervious strata whose identity and value may be lost in diagnosing reservoir conditions on the small-scale log, may be readily discernible upon the large-scale log.

While the interpretation of the electric log is in itself a separate subject, several points in this connection are worthy of consideration here. The porosity curves a misnomer which has grown through common usage, relates more the permeability due to the component of electric current generated by infiltration. This is found to be true in many fields where the so-called "porosity curve" correlates well with permeability obtained from cores (Figure 1).

Resistivity diagrams, true to their name, indicate the combined resistivity of formations and their contents. These diagrams, including the third and fourth curves, are dependent somewhat upon the resistivity of the mud fluid in the well. Therefore, the resistivity of the mud, as well as the temperature at which such measurement is made, should appear on the log along with other basic data. One of the principal reasons for the adoption of the third and fourth curves was to rectify the effects of infiltration from the drilling fluid by measuring formation resistance in a larger electrical field and hence at greater lateral penetration. Since the amount of such infiltration is dependent upon the charactristics of the drilling fluid, its properties should also be indicated upon the graphic log.

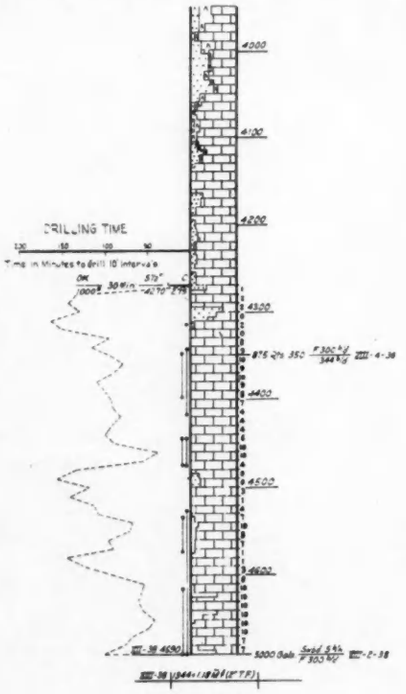

FIGURE 3
Completion Record—Limestone Field

While the electrical log cannot differentiate reliably between gas and oil, it does give an indication of the water level in many cases, and its use in this respect has become rather general. The myriad of variables which affect the resistivity diagram preclude 100 percent accuracy in such interpretation however. Experience shows it to be good operating practice to carry one of the early wells in a newly discovered field down to the water level, testing progressively at short intervals, once the oil column has been entered with drill-stem testing equipment (refer Figures 2 and 2a). This equipment, as well as the technique of operation, has become so generally accepted that it is superfluous to give it further consideration here. Each drill-stem test should, however, appear in complete detail in the graphic record as well as the written record, and while not indicated upon the accompanying sketches, it is suggested that when testing in the oil column the bottom-hole flowing pressure be indicated also, as these data are a measure of the permeability of the possible producing horizon. If the data concerning the water level upon the electric log are confirmed by drill-stem testing, the latter need not be repeated until wells are drilled in a different structural unit of the field, and possibly not then.

The foregoing paragraphs have given consideration in a general way to the more common basic completion data and the manner in which they should be recorded. There are, however, instances where special consideration is essential. In limestone producing areas it is believed by some that in coring the producing section the recoveries are apt to be selective, the more porous sections supposedly being lost through disintegration while cutting, so that only the denser, less porous sections are recovered. This has actually proven to be the case in some instances, and in order to improve the information as to the character of the producing section, drilling time curves are used, indicating the actual time to drill 5-foot (10-foot) intervals. These curves, when constructed upon a convenient scale and included with the graphic logs, as shown in Figure 3, give some indication as to the location and extent of the actual producing section.

Since the formations found in limestone producing areas are indurated, their cuttings lend themselves well to microscopic lithological determinations, so that also upon this basis the amount of porous and hence producing section may be determined to some extent. This is particularly true if the information so obtained is indicated upon the graphic record, as shown on the right-hand side of the formation log in Figure 3, where the amounts of porosity have been estimated by the observer in each 10-foot sample. The symbol on the left-hand side of the log in the same illustration shows the relative amounts of good and poor porosity. These data, in conjunction with the drilling time curves, should give a fairly good indication as to the location and extent of the oil-bearing strata through inference that all porous sections will contain oil or gas.

In true limestone producing areas a study of insoluble residues following digestion of the formation sample in HCl offers considerable possibilities for correlation within the reservoir itself, even though the accumulation of oil may be in some cases independent of local structure.

Temperature surveys have a specialized application in the completion problem. While generally useful in locating gas and water, they are particularly helpful in the foregoing case of a limestone producing section in indicating the vertical extent of the gas cap, as shown in Figure 4. Generally, the electrical log in limestone areas has proved to be of less utility than in the coastal or sand producing areas. It is hoped, however, that research, which is now being undertaken, will improve either the interpretation or the character of logs in limestone areas. Strangely enough, there are already limestone producing areas (Rodessa trend for example) where the electrical log has nearly as much utility as in sand areas, and in such cases (refer Figure 1) are essential in effecting a selective completion.

Actual Completion Data

Once the basic completion data are in hand and have been set down graphically, as well as progressively, in the written record, the actual completion

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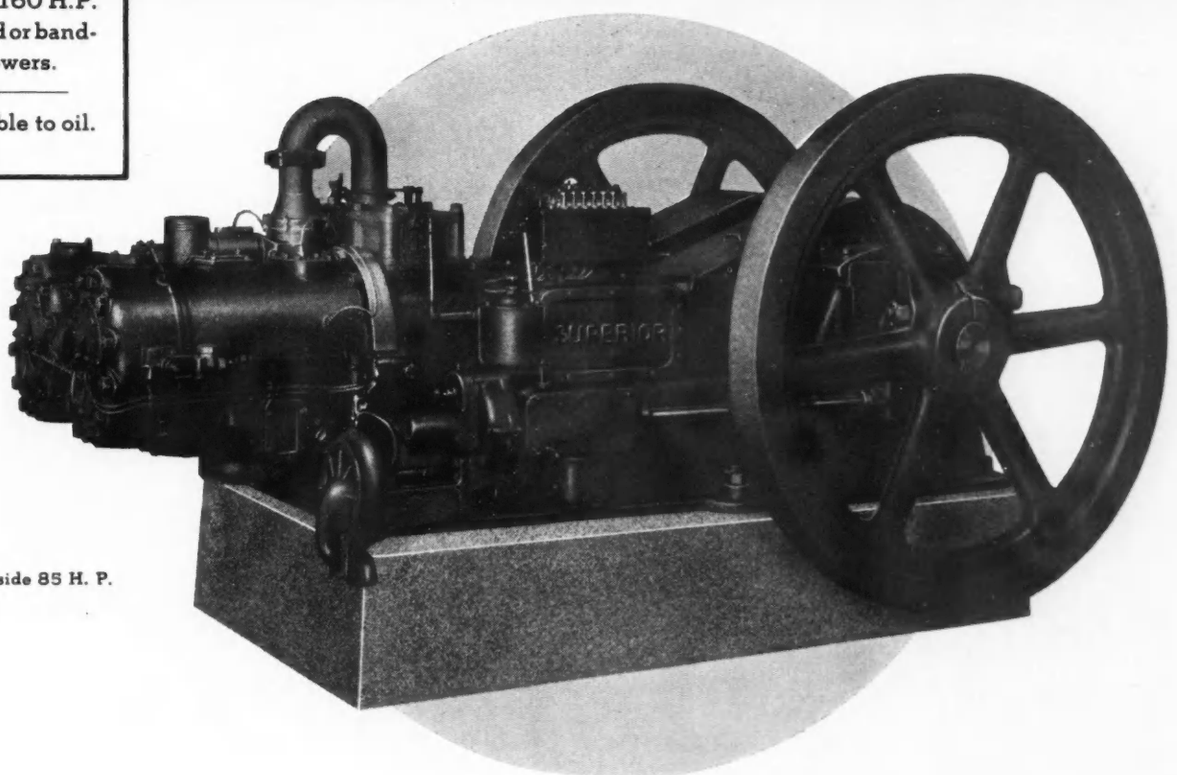

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may be undertaken. As stated initially, data pertaining to the actual completion are those which involve the mechanical details of completion itself, such as setting and cementing casing and testing thereof, the setting of screen and liners, production packer and so forth, as well as shooting and acidizing. For example, Figure 1 shows that 7-inch casing was cemented with 350 sacks of cement at 5994 feet. Similarly, Figure 3 shows that 5½-inch casing was set on a shoulder at 4270 feet and cemented with 275 sacks of cement and thereafter the shut off was tested satisfactorily for 30 minutes under 1000 pounds pressure. A suggested graphic illustration for a liner setting is given in Figure 2 which indicates the amount of blank and screen as well as the gauge of the screen and its location in the well. Figure 3 is an example showing actual completion data in connection with shooting and acidizing. In this illustration the production before and after treatment is shown, and in the case of shooting, the interval is indicated at the top of the chart. The figures on the right-hand side of the well column indicate the number of feet of porous section in each 10-foot interval. It should be recognized that from the standpoint of analyzing reservoir performance at a later date, the productivity before as well as after shooting and acidizing is of equal importance to the engineer making such a study.

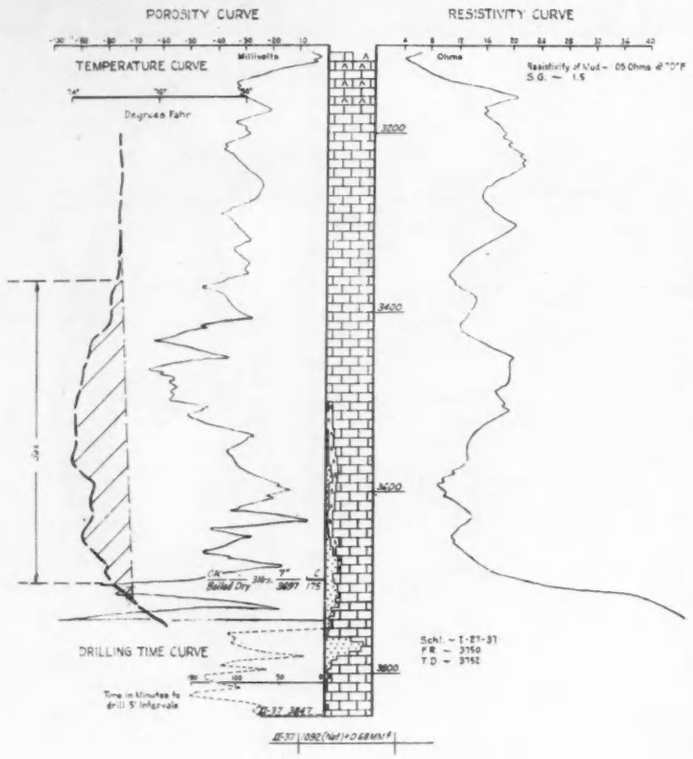


FIGURE 4
Completion Record—Limestone Field

The data stressed under this discussion may not be particularly necessary in effecting the completion itself, since the procedure to be followed has been determined by the basic completion data, nevertheless it is of importance that they be initially recorded graphically as they will be necessary as a ready reference during the productive life of the well and during the remedial work which is sure to come.

Here, as well as in the basic completion data, measurements are of first importance as it is essential that all data be correlated with regard to depth. It might be argued that in planning a selective completion, the final string of casing will be set on bottom and therefore any errors which may be made can easily be rectified. Greater flexibility in procedure is, of course, one of the reasons for so setting casing, but the operator is immediately confronted with the necessity of accurate measurement in gun perforating. It is the writer's suggestion that in addition to the excellent measuring devices employed in such work, the actual perforating depth be checked from a fixed point, the depth of which has been predetermined by drill pipe or casing. Where this is impossible, it would seem advisable to set a plug at a positive point for reference.

Performance records and data are, of course, kept automatically over the life of a well; however, as far as completion data are concerned such data should be very brief, and it is sufficient to say that it is desirable that some standardized procedure be adopted which is readily understandable as well as usable.

It is only necessary as far as completion data are concerned, to give the following information on the graphic record, and a simple procedure is suggested at the bottom of each of the illustrations, particularly Figures 3 and 4:

1. Initial oil production.
2. Initial water production.
3. Initial gas volume.
4. Choke size.
5. Completion date.

All other data may be included in the written record, since it is assumed that more detailed data will be included in the symbols appearing upon the production map.

Conclusions

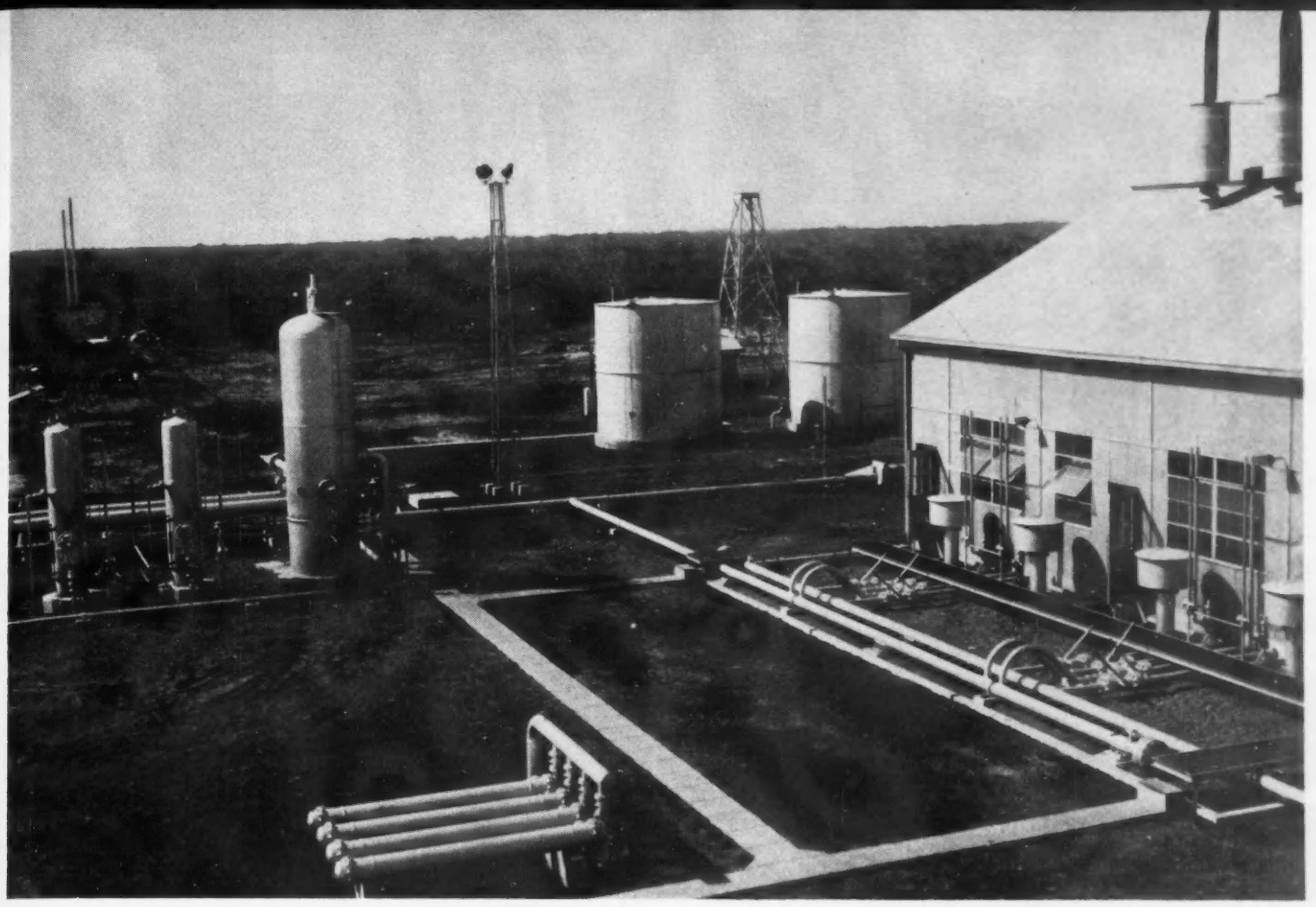
Usability should be the keynote in assembling data and keeping records, although admittedly we sometimes are not aware initially what data may ultimately become usable and valuable. The data included in the graphic record should only be that which have a correlative value either with regard to other data or other wells, while the written record should be unstinting with regard to all factual details. This is evident when it is realized that the facts are buried thousands of feet in the ground and may never again be repeated in exactly the same manner.

The graphic recording of completion data is of growing importance and thought should be given to standardized procedure for the industry to follow, keeping it in mind that only simple time saving symbols should be employed. There are several good reasons why the proper recording of completion data is important:

1. Technical—the graphic record is a tool of the engineer and geologist and should therefore be complete and understandable by all.
2. Scientific—the proper recording of actual facts gives the research engineer a background of fact which will eliminate lost motion in this direction.
3. Legal—the graphic record with the subsurface deductions to be made therefrom is admitted as evidence in conclusion.

This paper is intended only to convey certain suggestions as to procedure, particularly in the matter of assembling data and keeping records and naturally is not all inclusive. It is hoped, however, that it may enable further discussion along the same line.

The writer wishes to acknowledge the helpful suggestions of Dr. O. Wilhelm and Mr. A. F. van Everdingen in the preparation of this paper.



General view of plant: Shows all important apparatus, except cooling tower. Vessels, left to right: Low-stage weathering tank, high-stage weathering tank, main high-pressure separator, (2 water tanks in background), compressor building.

Pressure Maintenance for Economic Distillate Structure Production Is Essential

By HENRY N. WADE, Parkhill-Wade, Los Angeles

DURING the past year studies have been made[1] of the economics of so-called distillate well production on 17 different wells located on six separate structures, ranging from the Agua Dulce field, near Corpus Christi, on the south to the La Blanca and Rincon structures near Edinburg, Texas.

This investigative work has resulted in the design and construction by us of one production and pressure-maintenance unit processing 50 million feet per day of gas and producing 45,000 gallons per day of distillate, and has laid the groundwork for two more projects now about to start construction.

[1] These surveys made by the writer's company in collaboration with Stearns-Roger Manufacturing Company, Denver, Colo.

General Description of Structures

The structures tested are all comparatively small, oval-shaped closed domes, with the long axis of the ovals running roughly northeast and southwest. In every case there are numerous productive sands, ranging in thickness from 3 or 4 feet up to 30 feet. On several of the structures around Corpus Christi there are 10 or 12 distinct sands at depths ranging from 4500 to 6800 feet.

Productive areas vary from a hundred acres to four or five thousand. There is evidence of wide differences in productive areas between different sands in the same structure; in general the upper sands appear to be more extensive than the deeper ones.

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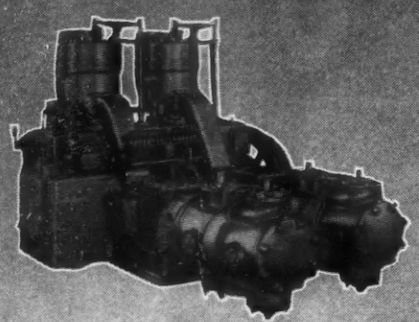

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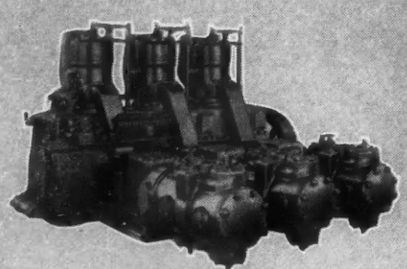

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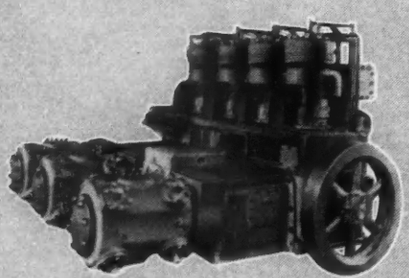

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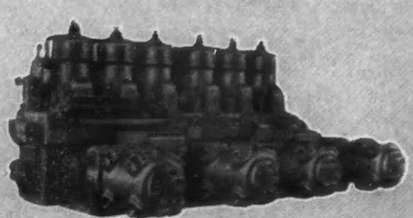

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The company selected CLARK "Angle" Compressors for this important plant because, while equalling any former type in power and efficiency, these compressors have introduced 4 basic savings: (1) Shipment assembled; (2) Smaller foundations, floor space and buildings; (3) Lowest fuel consumption; (4) Lowest maintenance.

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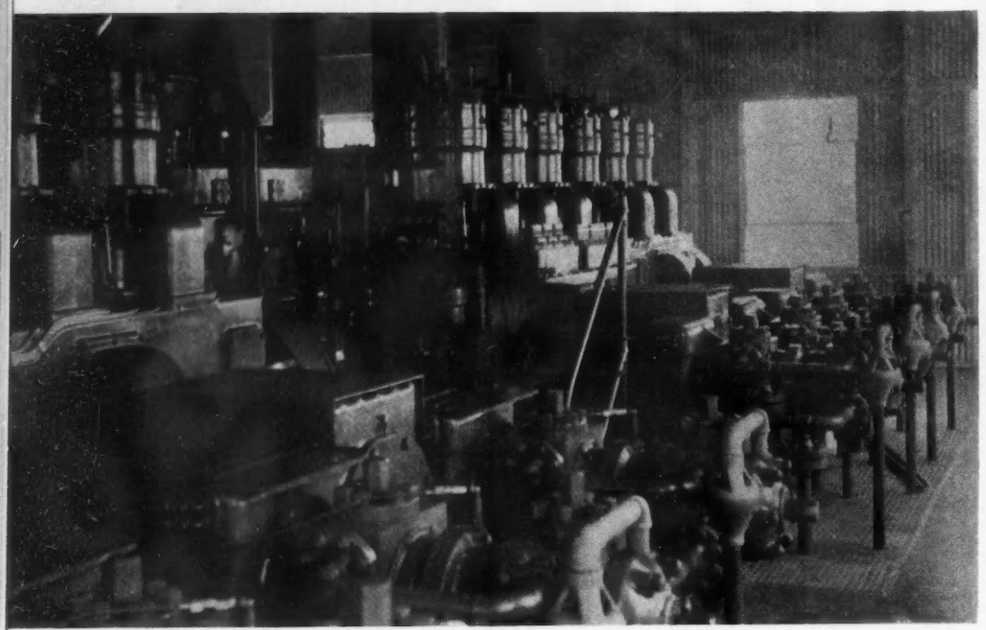


Compressor ends of 600 "Angle" compressors. Four of these units, installed back to back, handle 50 to 55 million cubic feet of gas daily, operating at 1200 pounds suction, 3000 pounds discharge.

duction ranging from 5 to 10 million cubic feet per day can be taken without excessive pressure drop.

Methods of Production

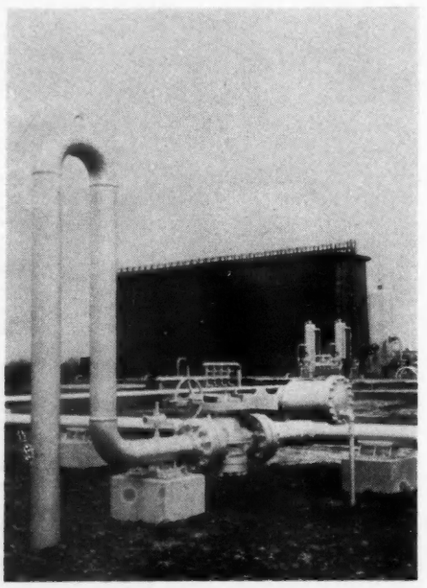
It is now definitely established that all the hydrocarbon materials in a distillate structure are in a vaporous or gaseous state; in fact, this is the basis for legal definitions of distillate structures, to distinguish them from normal oil and gas structures. Due to the well-known principles of retrograde condensation, even the heaviest hydrocarbons remain in the vapor state in the formation, on account of the combination of extremely high pressures and moderately high temperatures.

Upon cooling and partial release of pressure, such as occurs when the gas is produced through a choke into a conventional separator held at say 600 pounds pressure, part of the heavier hydrocarbons condense and separate from the gas. This method of production has been in wide use on the Gulf Coast for the past five or six years; in producing the heavier distillates it is fairly efficient, but it becomes very inefficient when applied to gases yielding the lighter grades of distillate.

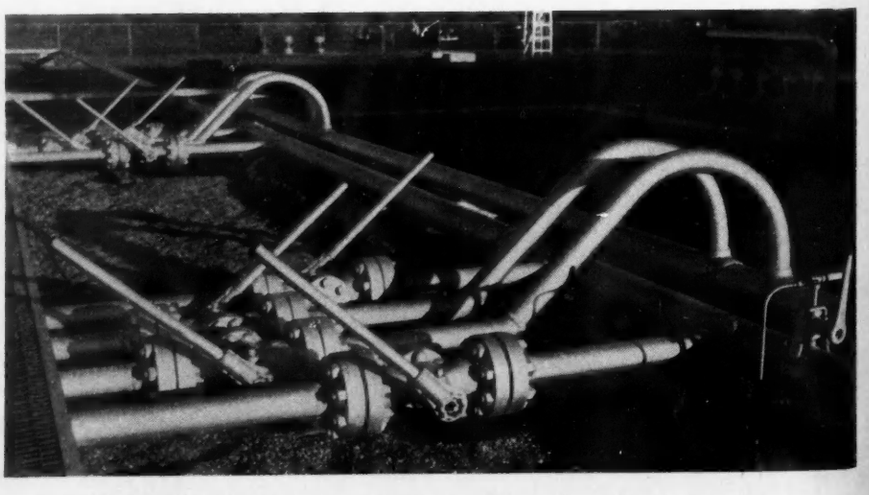
The efficiency of this single method of production can be improved by applying artificial cooling, in addition to the natural cool- through the well tubing, and during which occurs during the flow of the gas from the hot formation ing expansion through the choke. This cooling can be done in various ways, such as by cooling coils in an atmospheric cooling tower, by regenerative heat exchange to enhance the effect of the expansive or Joule-Thompson cooling, and by artificial refrigeration. Several plants have been built using one or more of these methods.

Our field testing and experimental work have shown that fair efficiencies of extraction can be attained by the simple method of cooling and expansion to some moderate pressure, say in the range of from 800 pounds to 1200 pounds in the separator. However, as will be pointed out later, it is essential that the stripped gas be returned to the producing formation; hence it is desirable to keep the separator pressure as high as possible in order to save compressor power required to pump the gas back. Tests and plant operating results show clearly that it is necessary to operate the separator at pressures of 1200 pounds or higher in most cases, in order to keep the pressure-maintenance compressor investment within economic limits; and this pressure at the separator requires a separator temperature in the neighborhood of 0° F. in order to get reasonably efficient extraction. Such an operating temperature requires dehydration or brine injection in order to prevent freezing of water in the apparatus, in addition to the normal operating complications introduced by low temperatures.

In view of these facts, it is our present opinion that high-pressure absorption will probably prove to



Remote-operated shut-off valve on re-pressuring main line — for emergency shut-down.



Detail of high-pressure compressor piping—branches into units.

Oil Men Agree...

"USE UNAFLO *for* TOUGH CEMENTING JOBS"

Read what engineers, drilling contractors and division superintendent say:

Division Engineer, major oil company (Okla. City). "Since we have Unaflo, figuratively speaking, we go about these tough work-over jobs whistling."

Division Field Engineer, major oil company (Houston). "What's good for the toughest job sure can't be bad for an easy job. In South Louisiana we use Unaflo extensively. Our superintendent wants to keep out of a jam."

Chief Engineer, major oil company (Houston). Unaflo is written in our orders to field men for tough jobs, on the basis of our own laboratory tests."

Division Development Engineer, major oil company (Houston). "After getting in trouble on two deep wells, we changed to Unaflo. We decided that if we were going to pay for a safety factor we should have all we could get."

District Superintendent, major oil company (East Texas). "Over 60 repair jobs with Unaflo. Average slurry weight 17.3 pounds per gallon. Have been 'down' as long as 4½ hours and have never been caught. Find that by reducing water ratio from 40% to 30% we can build squeeze pressures at will. Keep making Unaflo as it now is."

Drilling Contractor (Corpus Christi). "Unaflo is taking hold here. The men in the field like it."

Field Engineer, a cementing company. "About 75% of these squeeze jobs that I make use Unaflo."

Division Superintendent, major oil company (Corpus Christi). "You can run Unaflo heavy and avoid trouble. I ran Unaflo 16.2 pounds per gallon on squeeze job with excellent results."

SAVE MONEY by using Unaflo first on your next job. Universal Atlas Cement Co. (United States Steel Corporation Subsidiary), Amicable Bldg., Waco, Texas; Kansas City; Tulsa; Oklahoma City.

REASONS BACK OF WHAT THEY SAY ABOVE

1. Gives you more time to get it down.
2. Mixes and places easily with 35 per cent water, thus eliminating need for excess water, a big menace to good cementing.
3. Remains fluid under high temperatures.
4. Easier to regulate viscosity at tub.
5. Hardens thoroughly with high density after it is placed.
6. Not stiffened by mud contamination.
7. Not affected by salt water contamination.
8. Hardens satisfactorily in sulphate water.
9. Meets the requirements for sulphate resistance.
10. Makes squeeze and plug-back jobs easier, surer, more successful.
11. Unaflo permits operator to control cement rather than being controlled by it.
12. Unaflo has been proved by oil industry by consistently "coming through in the clinches" ever since its introduction.

A CEMENT FOR EVERY OIL COMPANY USE AT OIL WELL, REFINERY, AND FILLING STATION

ATLAS PORTLAND CEMENT

For *surface* work and for cementing *surface* casing. Unaflo cement is recommended for *deep* well work.

LUMNITE CEMENT

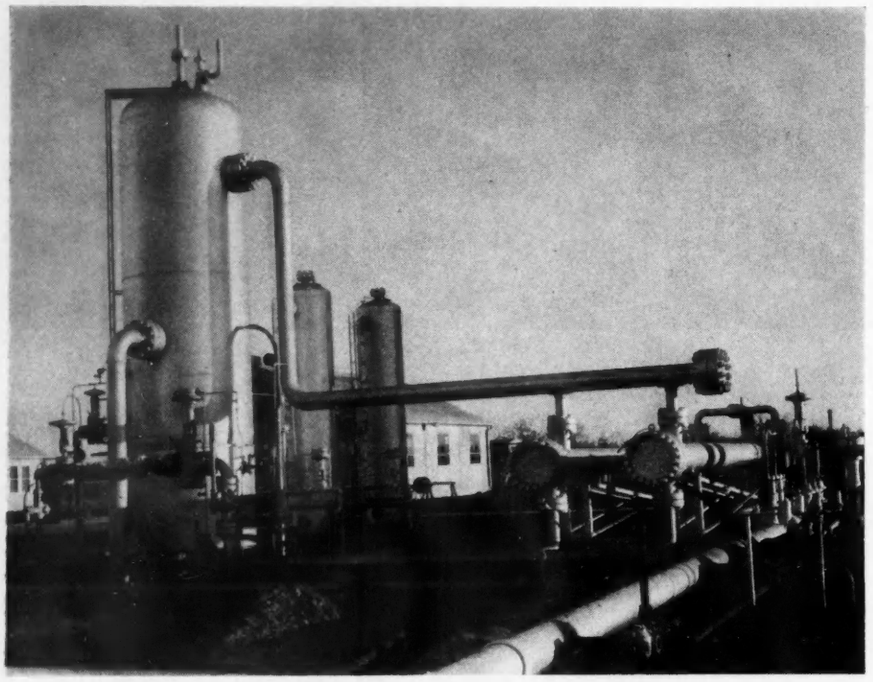
Is used in oil refineries for making refractory, insulating and heat-resistant concrete linings in still furnace walls, bottoms, roofs, foundations, ducts, flues and stack linings; tube sheet insulation. Lumnite cement makes corrosion-resistant concrete and mortar lining in distillation and cracking units; rerun stills; absorption systems; chemical treating and Ethyl plants.

ATLAS WHITE

The cement that is pure *white* and non-staining. Exceeds specification requirements for portland cement strength. Ideal for ornamental work in connection with service station construction and repair.

OW-U-3

Universal Atlas Cements



Detail of main separator and heat exchangers.

be the most economical method for processing distillate well gas. One such plant, designed to operate at 1200 pounds absorber pressure, is already in operation. Calculations indicate that it is feasible to operate absorbers at pressures at least as high as 1500 pounds per square inch with excellent extraction efficiency; the construction of a plant to operate at this pressure will probably be started very shortly.

Necessity for Pressure-Maintenance in Distillate Structures

It has been proved that the entire hydrocarbon contents of true distillate-type producing sands are in a vaporous state. It has also been proved, by direct experiment, that the heavier components of the vapor will condense into liquid form if the pressure is reduced, with or without a reduction in temperature. Consequently, if a distillate sand is produced under usual oil field conditions, without returning the dry gas to the sand, the pressure in the sand will decline, and eventually distillate will start to condense in the formation. The condensed liquid will be thinly diffused through the solids of the formation, merely dampening them with distillate; such liquid obviously can never be brought to the surface by any known method of production. Thus a large part of the valuable liquids in the gas will be permanently lost.

These arguments apply with particular force to structures of the type investigated. The total volume of vapor in any particular sand may be comparatively small; hence a reasonable rate of gas withdrawal per well may produce a rapid pressure decline, unless the gas is returned. Water-drive appears to be feeble in the structures we have examined; therefore it could have little effect in slowing down the pressure decline.

Experience so far, with pressure-maintenance or recycling operations on distillate properties has indicated that there is no particular tendency for dry gas from an input well to by-pass or channel toward producing wells. It is, of course, essential that the input wells be as remote as possible from the producers.

Although there is some disagreement as to the proper arrangement of producing and input wells, the most logical procedure seems to call for drilling input wells around the edge of the formation, as close as possible to edge water, and the producers near the center.

Nature of Production

Tabulated below are the extremes of some of the properties of the distillates recovered from all the wells tested. In general, the shallower sands produce distillates of lighter gravity and lower end-point than the deeper sands; also, the distillate "wetness" or gallons per thousand cubic feet, of the gas, increases with the depth of the sand.

Very broadly, the distillate liquid has most of the properties of a medium to poor quality third-grade motor gasoline. It is practically all water-white, sweet, non-corrosive, low in sulphur and gum, and rather highly susceptible to tetraethyl lead for raising the octane number. Practically all the distillate shows 10 to 20% of materials boiling above 400° F., which could be used for Diesel fuel, furnace oil, or (by simple fractionation) for making kerosene.

Recoveries of liquid per 1000 cubic feet of gas run from extremes of 0.4 G.P.M. to nearly 3.0 G.P.M.; most of the production running 0.75 to 1.0 G.P.M.

SUMMARY OF TYPICAL DISTILLATE CHARACTERISTICS

GRAVITY, ° A. P. I.	54° to 70°—Average around 60°
REID VAPOR PRESSURE AT 100° F.	5 to 12 lbs. per sq. in.
OCTANE NUMBER	40 to 60 (1 well, 14; 1 well 76)
COLOR	30+ (except straw at 2 wells)
DOCTOR TEST	Negative (no exceptions)
GUM	3 to 16 Mg/100 cc.
CORROSION	Negative (no exceptions)
SULPHUR, PRESENT BY WEIGHT	0.004 to 0.022

DISTILLATION CHARACTERISTIC (A. S. T. M.)

I. B. P.	78° F. to 162° F.
10 percent	128° F. to 232° F.
50 percent	202° F. to 364° F.
80 percent	255° F. to 462° F.
E. P.	360° F. to 572° F.
Percent over 400° B. P.	0% to 38%

TYPICAL WET GAS COMPOSITIONS BY FUNDAMENTAL ANALYSIS

	Medium Product (Mol. Percent)	Light Product (Mol. Percent)
Methane	91.50	89.60
Ethane	3.95	4.60
Propane	1.62	2.07
Butanes	0.90	1.60
Pentanes	0.42	0.82
Hexanes	0.35	0.51
Heptanes plus	1.26	0.80

4 PROVED MEANS TO SAFER, QUICKER, MORE ECONOMICAL DRILLING IN THE ILLINOIS BASIN

AQUAGEL *Gel-Forming Drilling Clay.* Used with outstanding success as a mud conditioner in the Illinois Basin. The daily addition of a few sacks of AQUAGEL provides excellent suspending and wall-building qualities, checks minor losses of circulation and acts as a lubricant for drilling tools.

BAROCO *An Economical, Salt Water-Resisting Drilling Clay.* The high yield of BAROCO and its resistance to brine encountered in Illinois fields, make it one of the most valuable drilling clays that can be used in this district.

FIBROTEX *Fibrous Material for Preventing or Regaining Lost Circulation.* A few barrels of FIBROTEX-laden mud placed opposite a porous formation often check expensive losses of drilling mud to the formation.

AQUAGEL FOR CEMENT

For Recovering Lost Circulation And Cementing Casing. AQUAGEL in cement imparts qualities to cement slurries which make them invaluable for cementing casing. Experience has shown that AQUAGEL-cement will reach a higher level behind the casing than an equal volume of neat cement due to less shrinkage and less loss of water and cement to the formation.

BAROID PRODUCTS ARE AVAILABLE IN ILLINOIS AT

FIELD SERVICE CARS

Available In All Active Oil Fields

Laboratory-equipped Baroid Service Cars, in charge of competent field Service Engineers trained in helping to solve drilling mud problems, are available to producers in all active oil fields of the United States. Tests and complete analyses of your drilling mud problems will be made right at the well at anytime on request, and without obligation.

OTHER BAROID PRODUCTS

BAROID: Extra-Heavy Weighting Material.
STABILITE: Chemical for Reducing Viscosity, Freeing Gas and Enhancing Wall-Building Property of Mud.
DISPERSO: Material for Counteracting the Effects of and Reconditioning Cement-Cut Mud.
TESTING EQUIPMENT: Apparatus for Making Complete Field and Laboratory Examinations of the Properties of Drilling Mud.

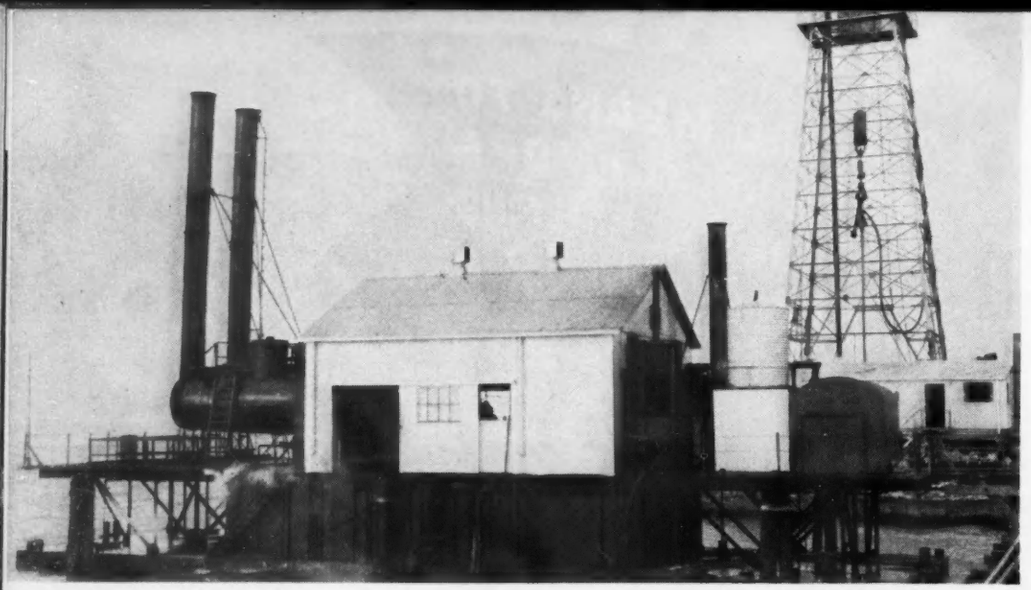
BAROID · AQUAGEL · STABILITE · OIL WELL DRILLING MUD SERVICE

Stocks carried and service engineers available in all active oil fields. Look for this trade mark under "Oil Well Drilling Mud" in your classified telephone directory for our nearest service engineer and distributor.

SEE OUR EXHIBIT BOOTH 224 AND 325 OIL WORLD EXPOSITION

BAROID SALES DEPARTMENT

NATIONAL PIGMENTS & CHEMICAL DIVISION OF
NATIONAL LEAD COMPANY
BAROID SALES OFFICES • LOS ANGELES • TULSA • HOUSTON



Two boilers and a superheater on one steel barge meet steam requirements for a heavy drilling outfit.

Steam Efficiency Attained On Four-Engine Powered Rig

By BRAD MILLS, Associate Editor

EFFICIENT utilization of steam power has been an important factor in Gulf Oil Corporation's barge drilling program along the Louisiana Gulf Coast. Use of four steam engines with each drilling outfit gives added flexibility through a wider power distribution, while a heat conservation program has materially reduced fuel oil and feedwater consumption.

Heavy steel drilling and boiler barges have been adopted by the company to meet difficult conditions encountered in the Mississippi delta area. Both barges are of the submersible type, and when sunk to rest on lake, bay or canal bottoms, they become derrick and boiler foundations. The steam-saving equipment is permanently mounted on the barges.

Several oil fields and a larger number of promising wildcat prospects have been located under water along the South Louisiana coastal strip. Extensive geophysical work has not stopped at the water's edge, and as the result of well organized efforts oil fields and indicated structures have been found under lakes, bays, rivers and even in the open gulf.

Gulf Oil Corporation's barge drilling outfits were designed to

WELL LOG

May 26	Surface 20"		24" Bit	0'-100'.	Blue Shale
27	58.52 bbl. Fuel Oil,36 gravity		17-1/2"Bit	100'-355'	Blue Shale Sand&Gr.
28	21.28 "		" "	355'-630'	Shale, Sand
29	53.20 "		" "	630'-1049'	" " Boulder
30	53.20 "		" "	1049'-1353'	" " "
31	37.14 "	Reaming last Jt.	" "	1353'-1600'	Sandy Shale
June 1	21.28 "	Set 52 Jts. 13-3/8 casing		1600'at 3:42 P.M.	
2	26.60 "	Shut down. Waiting on cement.			
3	"	" " " " "			
4	37.14 "	" " " " "			
5	37½ "		12-1/4"Bit	1600'-1843'	Shale, bearing Sand
6	31.92 "		" "	1843'-2238'	Sandy Shale
7	61.16 "		" "	2238'-2505'	" "
8	58.52 "		" "	2505'-2832'	" "
9	42.56 "		" "	2832'-3085'	" "
10	47.88 "		" "	3085'-3453'	Grey Sand
11	42 "		" "	3453'-3688'	Sandy Shale
12	55 "		" "	3688'-3983'	Grey Sand
13	47.88 "		" "	3983'-4375'	Blue Sticky Shale
14	53.20 "		" "	4375'-4562'	Grey Hard Sand
15	63.84 "		" "	4562'-4796'	Blue Sticky Shale
16	53.20 "		" "	4796'-5045'	Grey Hard Sand
17	53.20 "		" "	5045'-5192'	" " "
18	53.20 "		" "	5192'-5350'	Sticky Shale
19	74.48 "		" "	5350'-5432'	Hard Shale
20	69.16 "		" "	5432'-5610'	" "
21	69.16 "		" "	5610'-5826'	Brown Sandy Shale
22	61 "		6-1/8"Bit	5823'-5868'	Blue Sandy Shale
23	52 "	Reamed 6-1/8"to 12-1/4"		5868'-5931'	Brittle Shale
24	72 "	" "		5931'-6037'	Blue "
25	61.18 "	Reduced 6-3/4"		6037'-6106'	Sticky "
26	61.18 "	Two Trips "		6106'-6151'	Sandy "
27	50.54 "	" " Testing		6151'	Bottomed

TOTAL DRILLING DAYS 28
AVERAGE HOLE PER DAY .....216'
AMOUNT OF FUEL PER DRILLING DAY ..52.4 bbl.
TOTAL FUEL USED .....1465.53 bbl.

This well log gives data on fuel oil economy.

They're Using a UNION *PRE-FORMED* Rotary Line

—because they want MAXIMUM drilling-line economy

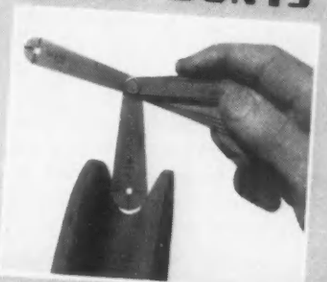
Field records definitely prove that pre-formed rope — despite its slightly higher first cost—makes the most economical Rotary Drilling Line. This is because Rotary Drilling Lines must withstand severe bending, drum grinding and crushing. UNION Pre-formed ("UNION-formed") Rotary Lines are slower to fatigue under repeated bending because the individual wires and strands are not placed under a constant bending stress when laid into the rope, but are given the exact helical form they will take in the rope. This results in a stress-free rope.

"UNION-formed" also wears longer under drum grinding and crushing, because the exactly formed wires unite their strength to give the rope a firm body which better resists crushing—and because when outside wires become worn, they will not arch in the strand but lie flat and thus escape excessive friction.

"UNION-formed" Lines are also most economical for Tubing and Sucker Rod Lines, as these lines also must withstand severe bending.

The line on this well—Arkansas Fuel Co., Marion County, Texas,—is a 1⅛"x1300' 6x19 Flexible Seale, Improved Plow "UNION-formed" Rotary Line with Hemp Center. The men, left to right, are: Mose Browning, drilling supt., with D. Thomason Drilling Co.; C. C. Robinson, Union Wire Rope Corp.; H. B. Horton, fireman; Brad Walston and Hugh Castle, helpers; N. G. Alexander, derrickman; Pete Pylant, driller.

ROPE "DON'TS"



Don't let worn grooves in sheaves ruin your rope by pinching it and thus preventing free movement of the strands. Always test each groove for wear, with a groove gauge the same size as the new rope. If gauge seats in bottom of groove the groove is not worn. But if gap is present the sheave should be replaced immediately.

union FORMED

UNION WIRE ROPE CORP

UNION WIRE ROPE CORPORATION . . . . . KANSAS CITY, MO.

Sales Offices: Beacon Bldg., Tulsa, Okla.; Fort Worth, Texas; Houston, Texas; Chicago, Ill.

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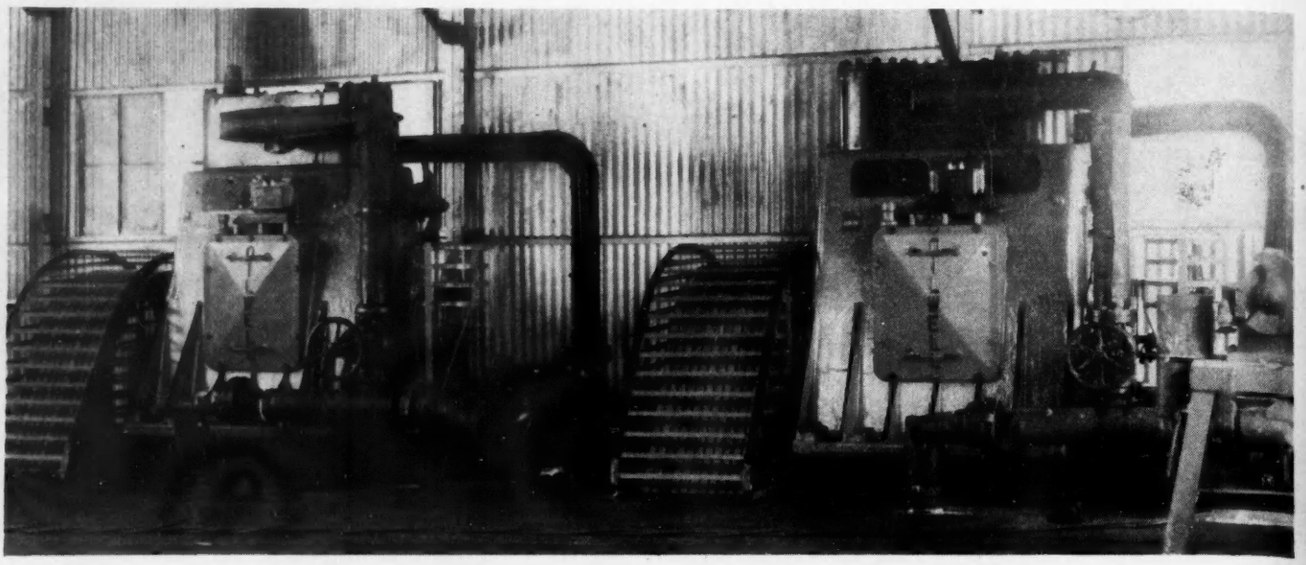
UNION WIRE LINES

The "ULTIMATE LOW COST WIRE ROPE"



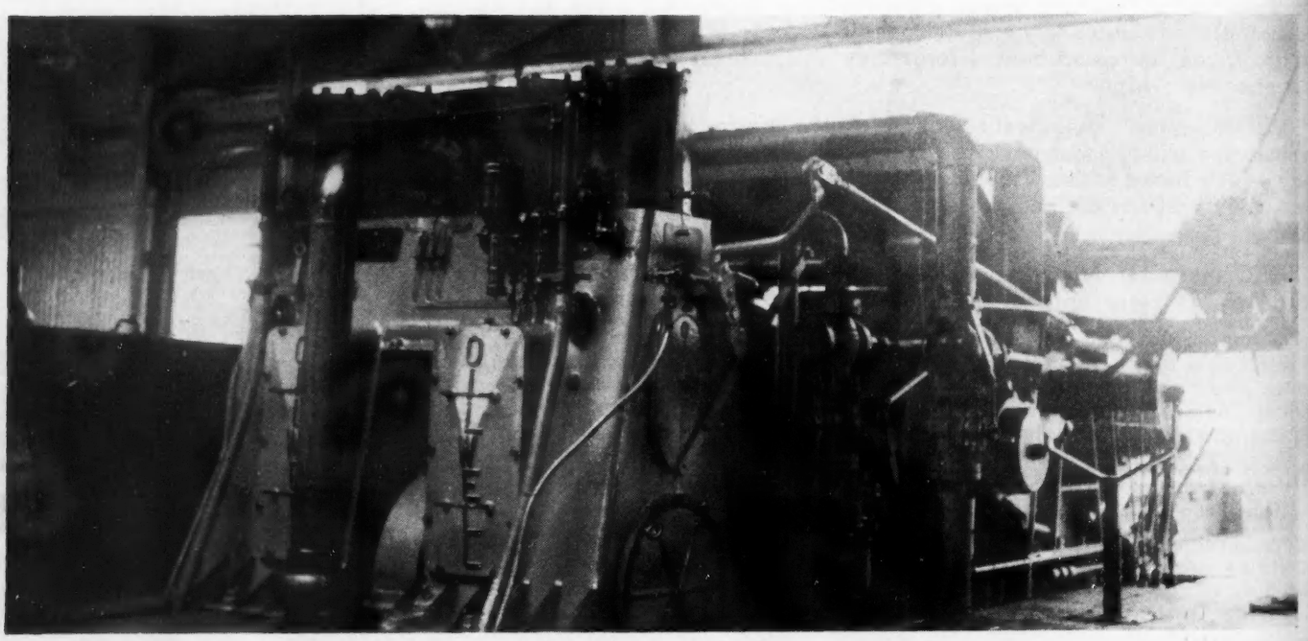
Two 10 x 9 vertical twin-cylinder steam engines on upper deck of the barge. Each drives a 7¼ x 17 power pump on the lower deck.

drill "water" locations with the greatest possible saving of fuel oil and feedwater. The arrangement of equipment was perhaps the first that included four steam engines and only two boilers. The generous allotment of engines has made possible the application of suitable power to each phase of drilling operations.

Use of a separate steam engine for driving the rotary table is not a new practice, but it is one that has conserved steam during drilling operations. The 7¾ x 7 vertical type, twin-cylinder engine used is much more economical in the use of steam than the heavier draw works engine, since it operates at a more efficient point on its horsepower curve. The power required to operate the rotary table is ordinarily far below that at which the heavy draw works engine is designed to operate, and for this reason the smaller rotary table engine conserves steam. The engine operates through a two-speed, direct drive to a 27½-inch rotary table, and is equipped with a variable cut-off control. The rotary table and engine are mounted on a structural steel base that makes a single portable unit. A two-speed gear box is attached to the frame of the engine. The shaft extending from the gear box is connected direct to the pinion shaft of the rotary table by means of a chain-type flexible coupling. A sprocket makes possible the use of this small engine for pulling the drill pipe in case of failure of the hoisting engine. Use of this separate and direct drive to the rotary table has reduced derrick noises and conserved derrick floor space.

Slush Pumps

The slush pump arrangement has attracted considerable attention, each 7¼ x 18 power pump being driven by a 10 x 9 twin vertical



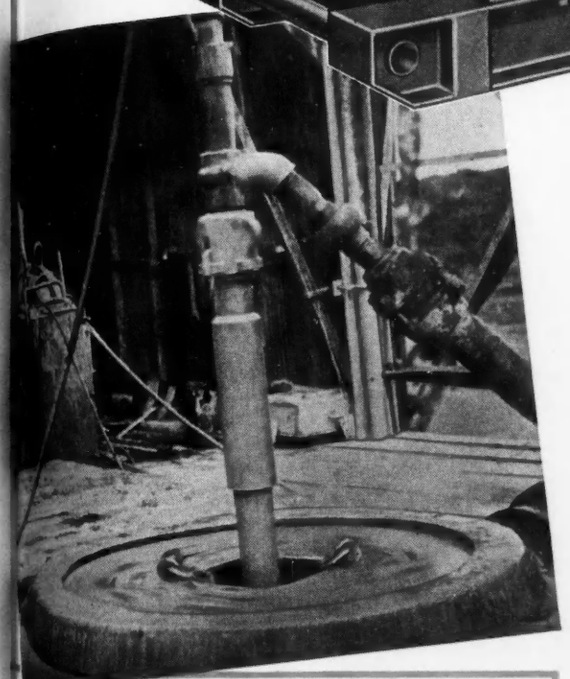
Vertical 12 x 12 twin-cylinder steam engine used for hoisting.

Deepest Test in Texas Drilled in Agua Dulce at 13,728 Ft.

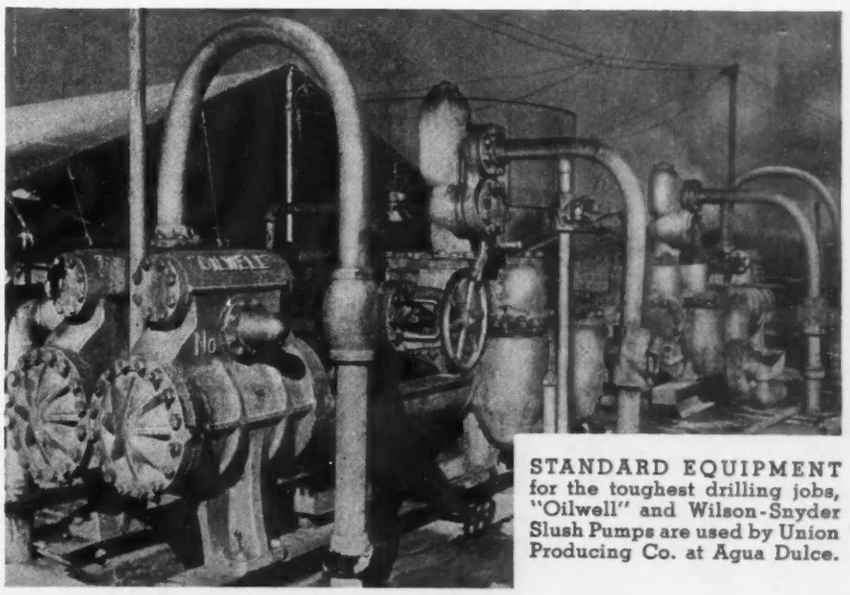
Union Producing Company takes full advantage of drilling unit features in conquering heaving shale

"OILWELL" Rotary Drilling Units have drilled many of the deepest wells. On Union Producing Company's No. 1 Minnie Brown, an "Oilwell" Drilling Unit has played a leading part in overcoming heaving shale and other adverse conditions.

Effect substantial savings by using an "Oilwell" Rotary Drilling Unit! Or adapt an "Oilwell" No. 7 Engine to your present rotary. You'll never go back to a chain driven rotary! Send for descriptive bulletin today.



ROTATING WITH 13,000 ft. of 18-lb. drill pipe suspended from slips in the table while circulating in heaving shale.



STANDARD EQUIPMENT for the toughest drilling jobs, "Oilwell" and Wilson-Snyder Slush Pumps are used by Union Producing Co. at Agua Dulce.

OIL WELL SUPPLY COMPANY

Branch Stores in All Oil Fields

Subsidiary of United States Steel Corporation

"OILWELL"

steam engine. The engines are placed on the upper deck of the barge and drive the power pumps on the lower deck with V-belts. The engine on each pump is capable of developing adequate horsepower with about half the steam required on direct-acting steam pumps. This is accomplished by using a variable cut-off feature on each engine, an arrangement that uses the steam expansively.

The steam engine used for hoisting is a 12 x 12 twin vertical type installation. The drilling barge moves as a unit, and it is not necessary to break contact in any way between this heavy engine and the draw works.

The use of two boilers is a departure from the usual practice with heavy drilling outfits. Three and four boilers are ordinarily used where heat conservation is not seriously considered. The two boilers are the 125-horsepower type, operate at a 350-pound steam pressure, and use live steam jet stack blowers. The blowers employ half-inch valves that normally are one third opened. Each boiler employs a fuel oil burner, operating at 50 to 65 pounds with one-inch atomizing steam line. A separately fired superheater is used. The steam temperature ranges from 525° to 540° F. and a steam pressure of 20 to 25 pounds is carried on the superheater burner. Fuel oil is used.

Two 10 x 4½ x 10 boiler feedwater pumps are used, the speed ranging from 18 to 30 revolutions per minute. One pump runs all the time and the second about 15 percent of the time. One 5-10 x 6 x 12 feedwater heater pump is an important factor in efficient boiler operation. This pump operates at 20 to 30 r.p.m. and provides feedwater at a temperature of 200° to 210° F.

Other steam-consuming equipment in regular use includes three, 5-KW turbine type electric generators, one running day time and two running at night; one 6 x 4 x 6 duplex general service water pump, with speed from 12 to 18 r.p.m. and in operation while drilling; and one 16 - horsepower steam turbine for driving cooling water pump for condenser.

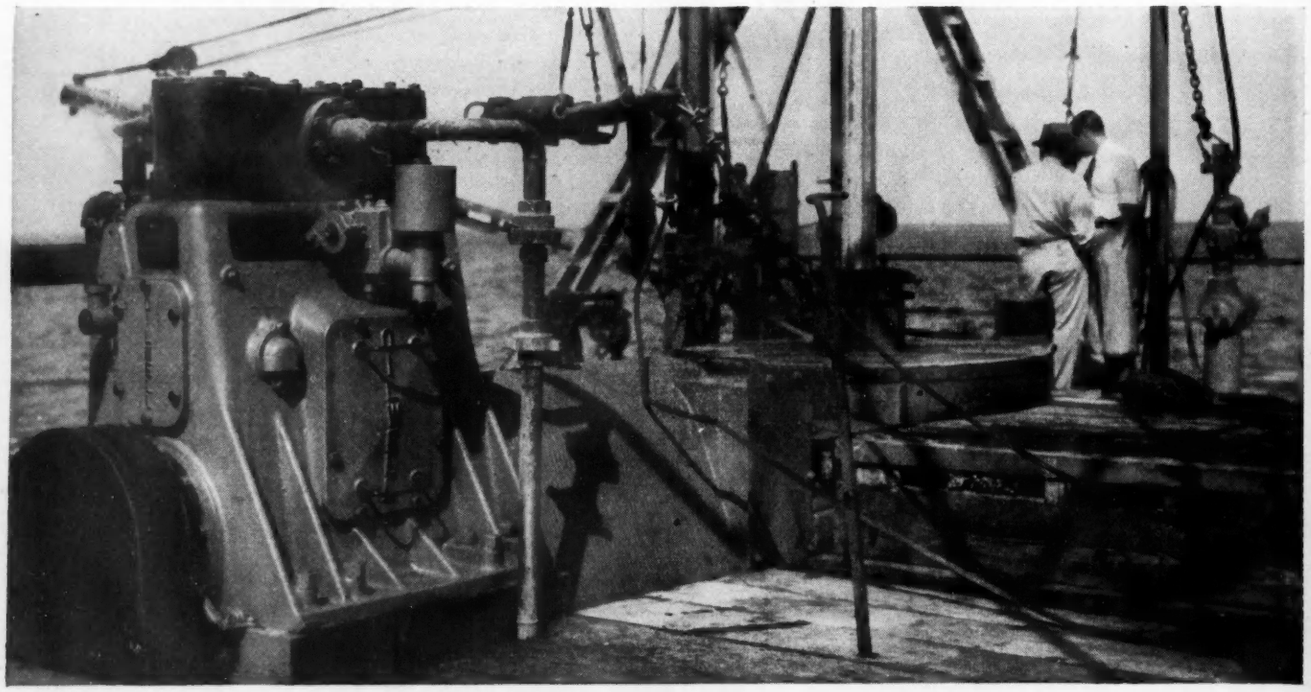
The feedwater heater pump is a combined feed pump and heater unit that employs essentially the same principles as the jet condenser used for heating feedwater. This is ordinarily referred to as the open type heater, since the cold feedwater in it is sprayed through a spring loaded valve and comes into direct mixing contact with exhaust steam at a pressure of about 10 pounds. Thus the feedwater is heated to around 210°F., which is within 20 degrees of the exhaust steam temperature.

The drive from each vertical steam engine on the upper deck to the power slush pump on the lower barge deck employs 11 V-belts of heavy construction. Each engine pulley is 50 inches in diameter, and the pump pulleys are the 50-inch type. Pump operation while drilling one well follows:

Depth	Pump RPM	Engine RPM	Mud Pressure	Liner Size
0-1600	32-40	195-250	250	7¼
1600-4500	38-45	228-270	250-450	7¼
4500-6100	38-45	228-270	450-600	7¼

Fuel oil consumption ranges from 40 to 75 barrels daily, but for ordinary drilling operations an average fuel consumption of 55 barrels daily is representative.

A typical steam barge rig of the above type is being used by Gulf Oil Corporation in Lake Borgne, about 25 miles from New Orleans. The company's Lake Borgne 4-RR State has been drilled to 10,630 feet. The barges are resting on the lake bottom in about 10 feet of salt water. The lake opens into the Gulf of Mexico and the water is almost as salty as that in the gulf. Transportation to the rig is by boat, the distance being about eight miles from the boat landing on U. S. Highway No. 90, east of New Orleans. Fuel oil is barged to location from various points. The location is on a geophysical prospect found by the company, and the present drilling well is the second started in the immediate area. The first well was abandoned after a heavy flow of salt water was encountered. Lake Borgne operations are typical of many along the South Louisiana coast line, but drilling conditions are much more severe than the average.



Vertical 7¾ x 7 Twin-Cylinder Steam Engine Driving the Rotary.

"BALDWIN LASTS LONGER"

. . . Says Mr. Butchee, veteran drilling superintendent of the Houston Oil Company. That's why he equips his rigs 100% with Baldwin Master and Baldwin Super Service Rotary Chains.

Mr. Butchee also says that on the basis of past experience he expects these very Baldwin chains will drill at least 100,000 feet. No wonder we say "Ask the Driller—He Knows!"

BALDWIN-DUCKWORTH CHAIN CORPORATION

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Safety Work Will Pay Small Operator

Lower insurance rates, better employee relationship and longer equipment life are some benefits obtainable by small firms through accident prevention work.

ON numerous bulletin boards throughout the oil country may be seen the recommendation to the worker that "Safety Pays." This appeal to the worker is based on several points: (1) If he is careful, he has a better chance to work steadier, avoiding costly periods of being "on compensation"; (2) he may escape total or partial permanent disability, thus prolonging his life of productive employment for himself and his family; (3) by building up a good safety record, he convinces his employer he is a careful workman, who will probably take better care of his employer's tools and equipment, again increasing his chances of staying on the job in comparison to the careless workman; and lastly, (4) he may ultimately increase his own pay, for reduction of accident frequency means a real saving to the employer, which in many cases can be passed along to the employees in hard cash.

What applies to the individual workman also applies to the company employing him, and since this has already been recognized by most of the major companies, the real missionary work must be done with those operators who do not have and probably will never have a full time safety department.

Many in this latter group have been reluctant to adopt any kind of safety program because they have feared the cost would far outweigh the savings gained, while others have been at a distinct loss as to how to start or what to develop in their own organization. Neither of these can be taken as a reason for final judgment for not adopting some type of program, for in the first place, there are many savings to be gained, and many that cannot be counted in dollars and cents, while the latter objection can be overcome by outlining some things which might be set up in a safety program, and with little cost.

A well planned safety program will repay the employer with lower accident rates, lower first aid equipment expense, a better understanding between the employer and the employee, and a better trained and more careful personnel, resulting in longer life for tools and equipment owned by the operator. These apply alike to the big producer or the smallest independent, and if the former cannot afford to ignore these benefits, certainly the latter is in less of a position to do so.

TABLE 1

Compensation Insurance Experience in the State of Texas

Data Computed from the records of the National Council on Compensation Insurance and which deal exclusively with the Manual Classification: "Oil and Gas Wells—Development in the State of Texas."

	1933		1934		1935	
	Earned Payroll	Earned Premium	Earned Payroll	Earned Premium	Earned Payroll	Earned Premium
	$14,832,855	$1,660,655	$21,704,596	$2,485,575	$24,197,051	$2,755,921
Class of Injury	Number of Claims	Losses Incurred	Number of Claims	Losses Incurred	Number of Claims	Losses Incurred
Death	34	$162,181	39	$186,165	57	$292,499
Permanent Total	7	32,889	7	37,388	8	28,780
Major Permanent	72	166,296	111	282,904	104	296,828
Minor Permanent	284	135,296	317	183,666	460	241,529
Temporary	1,497	156,669	2,178	258,749	2,150	285,190
Total Medical	....	173,460	....	240,609	....	272,933
Total	1,894	$826,764	2,652	$1,189,479	2,779	$1,417,758

Accidents Are Huge Expense

It is a startling revelation to realize through the medium of cold facts that within just two branches of the petroleum industry there were over $2,000,000 paid out in compensation and medical benefits in the State of Texas alone during a single year. This figure does not represent the total financial outlay for compensation insurance premi-

[*Continued on page 44*]

Small Firms Can Handle Safety in Several Ways

Independent operators may have practical accident prevention programs by the use of simple safety meetings, the poster or bulletin form, or cooperative movements.

WHILE the independent operator and drilling contractor, by comparison with the larger oil companies, may be somewhat handicapped in conducting accident prevention work, there are ways open to such concerns that offer sufficient benefits (see story opposite page) at a cost not out of line with results.

The practical safety problem confronting the independent can be handled in much the same beneficial manner as the larger companies handle theirs. The program itself can be carried on in many ways, using all or any one of a number of attacks. Three courses of action appear the most plausible: (1) safety meetings, (2) the poster or bulletin form, and (3) cooperative movements, in which a group of independent operators would form a pool of their safety experiences and share equally in the educational benefits and costs.

Generally speaking, there are two types of independent operators, and their problems for developing a training program are entirely different. The first has his production in one locality and his men conveniently located to gather in meetings; while the second will have operations scattered in several fields where meetings are practically impossible, unless there is a cooperative organization among several similarly situated firms.

But regardless of the type of operations held by the firm, either can use the foreman to advantage. (By "foreman' 'is meant anyone in supervising capacity, from the owner of the company down.) A field supervisor or toolpusher who has authority over a drilling crew is naturally the one to whom all the employes on that crew look to for their leadership.

Use of Meetings

Since even the smallest independent usually has a few regular foremen's meetings, it is not very difficult for him to present some safety ideas, plans and material for his group to carry down the line to the rank and file. He may lead a general safety discussion, or give a short talk stressing what has been done in other fields or what the possibilities are in his organization. Perhaps, he is in a state where there is an active highway patrol or state safety department, which he can always call on for a speaker to present the most pressing safety problem of today, that of safe driving and driving with safe equipment. With this start, it is not so difficult to point out why the men should look for hazards and danger points in their everyday work.

In meetings, discussion can be led on existing hazards and how they can be corrected at minimum cost. Methods of first aid, with government Bureau of Mines handbooks for texts, are always interesting enough to keep the meeting alive and the discussion moving. Certain accidents which have happened in a group or accidents on adjoining leases can always be profitably discussed, and since hindsight is always better than foresight, more remedies than one will usually come to light, even in a group not accustomed to thinking in terms of safety. At other times, it is possible to point out the dangers of horseplay on the job, and the experience of the group can be depended on to develop some cases of serious injury resulting from such playful procedure. Fire prevention, a very important subject, whether on the lease, in the office or in the home, is always a good topic. This, too, can be presented inexpensively on bulletin boards by posting accounts of some accidents or loss of life or property resulting from someone's carelessness. Fire prevention can also be handled from the standpoint of fire fighting equipment and what can be done in cases of various kinds of oil field fires. One company recently staged a very realistic blaze, which conveniently broke out near a well on the lease where the meeting was being held. Since only a very few knew of the plans, a very real assortment of reactions was presented for later study by the group.

Since asphyxiations by gas are all too common in the oil industry, this also is a legitimate subject for development in both preliminary precaution and later treatment of the victims. Too often, a life has been lost because the crew did not know of the danger in the first place, then failed to know what to

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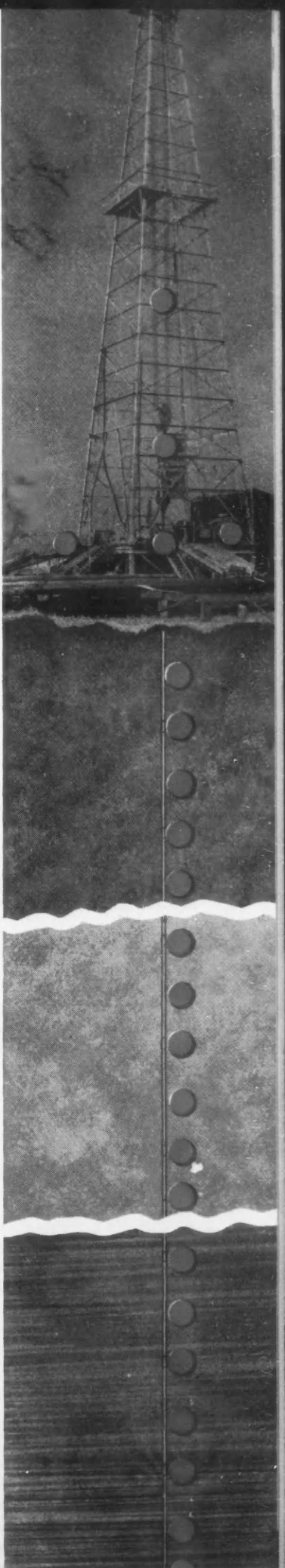
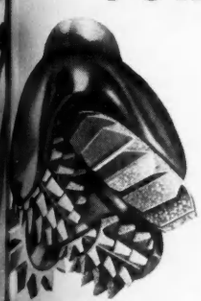


There is a

REED BIT

FOR EVERY FORMATION



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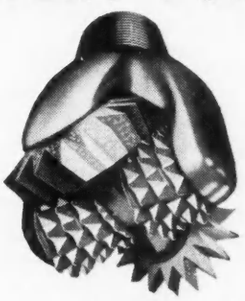
Digging



DK-1AA
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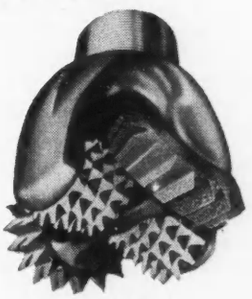
Softer Formations



DK-1
A General
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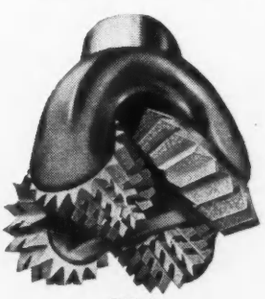
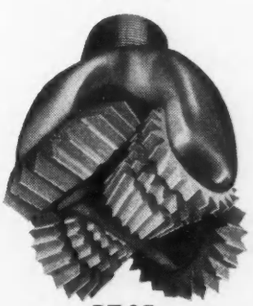
DK-1L
for the
Harder Limes

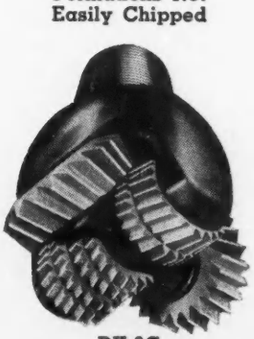


DK-2
For the Harder
Formations Not
Easily Chipped

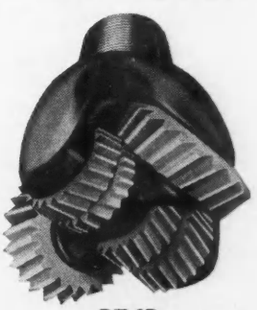


DK-2C
For the Harder—More
Abrasive Formations

DK-3
For the Harder
Formations with
Medium Chipability



DK-3C
For the
Very Hard Formations



DK-3D
for the
Extremely Hard
Formations

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do when one or more of the group was rendered unconscious.

Lack of good housekeeping on a lease is the cause of many preventable accidents and a meeting or series of meetings on this subject can bring no end of good. By pointing to the danger of upturned nails, loose timber, spilled oil, and carelessly thrown rags and waste, the operator will find his efforts repaid many times by improved appearance and lowered accident frequency. Spilled oil can cause painful falls as well as fires from the careless smoker, while the rags and waste are also definite fire hazards.

At the present time when so many laws exist to harass the oil producer, and law suits with juries are such a common thing in polution suits, transportation accident trials, and other damage claims of a miscellaneous nature, it is to every operator's advantage to cultivate the most favorable public opinion possible, and if he is in the marketing field, there is a double reason for his considering this question. To do this, he must avoid labor controversies as much as possible; have a reputation of fair dealing with his employees and general public; present clean, neat properties which will not be obnoxious to nearby residents of the vicinity he is operating in; and try to take some part in civic activities, or have his subordinates to in the community in which they live.

These all require education of his personnel, and without fanfare or announcement of advance intentions, every one of these can be worked directly into the safety program. The clean properties can be discussed under fire prevention and the good housekeeping topics; the civic activity participation can be developed from a beginning of teaching drivers of company cars and trucks to be courteous, and encouragement of any membership in Chambers of Commerce or other civic organizations; and many of the labor controversies which start with little or no real cause, can be discovered in meetings in which men and management meet on common ground, the safety meeting being one of the best. One can readily see the ramifications and advantages of a planned safety program, which can be set up with little planning and practically no organization.

Suggested topics other than those mentioned which might be used with a little study and preparation are: Use and inspection of safety belts; proper procedure in kicking off engines; danger of working around engine with magneto and spark plug connected; inspection of rod and tubing boards; use of ladders; where goggles should be used and why; precautions the derrick man should use to prevent dropping tools or other equipment; and the danger of loose boards on walkways, run arounds, and steps. The list could be extended indefinitely, but these will give an idea of the possibilities. Many of these can be developed in the meeting with the conference method, while others may require a little more study with some lecture, but all can be illustrated in some way for the bulletin board on the isolated lease.

Use of Posters

The question of how best one can present safety training to the greatest possible number and to where its need is the greatest is a matter that can be answered from practical observations. The safety bulletin is by no means a new idea; but, the thought and material contained in properly prepared bulletins is one of the most practical and basic means of getting constructive safety thoughts before the actual field employe.

For the individual workman too far from headquarters for group discussion, and where cooperative movements such as described in following paragraphs do not exist, the poster may be the only means. However, it is extremely valuable also as an aid in territories where meetings are possible.

Bulletins should be written in a practical and understandable manner, designed for study by the field employes. They should deal with specific practices and operations necessary in carrying on field work, such as hints for handling certain types of equipment, etc.

If it is not desired to have these bulletins prepared, they may be procured at small cost. Admittedly, however, they may not always apply to the particular concern using them, but on the other hand may be even more valuable in some instances as they represent composite pictures of safety thought. Some insurance companies cooperate in this work, the National Safety Council has scores of posters or bulletins available to members at nominal costs, and there is the safety department of the American Petroleum Institute and others. Manufacturers of safety equipment such as hard boiled hats, steel capped shoes, chip proof goggles, are only too glad to present their wares with illustrations of situations in which their products would be desirable. These, at least, make the workman aware of the hazard.

From the standpoint of the oil field personnel, there are certain points of concentration which seem the more logical places to install bulletin boards. Such places as the inside of toolhouses at drilling rig locations, and the inside of lease houses on production leases are natural points of employee concentration. At these points the employees' frame of mind is more receptive to thoughts that pertain to the actual work he will do or has done. Take for example a drilling crew just prior to going on tour. They all congregate in the tool house for the purpose of changing clothes. After the act of changing clothes is finished and before it is time to go on the derrick floor, most of those men will, in an effort to occupy the remaining few minutes, read any available reading matter that can be found in the toolhouse. Thus, it would seem wise to take advantage of this natural tendency and place before them constructive safety measures that would impel them to think of safety training as something that fits into their every thought and movement.

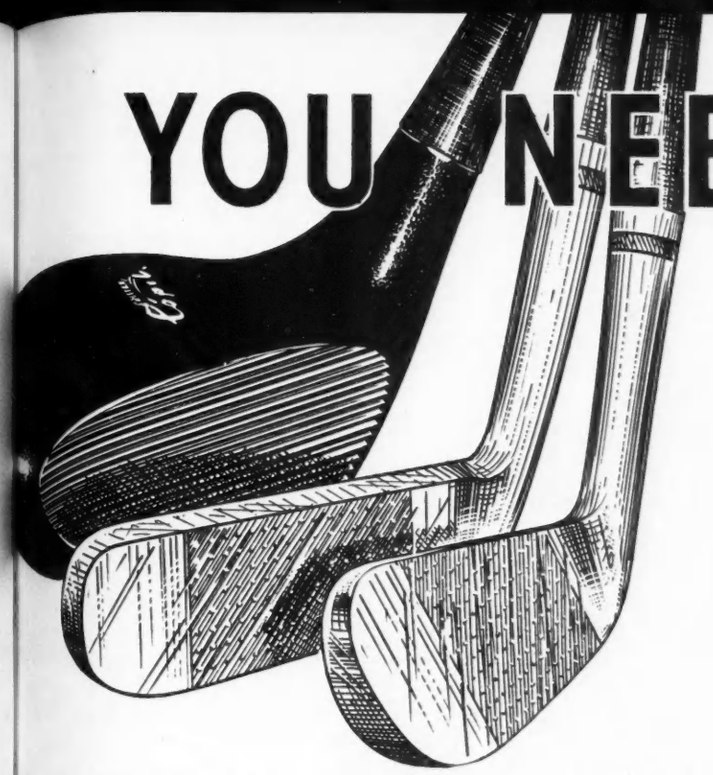
Use of Cooperative Movement

In many districts it would be advantageous to create cooperative safety movements among different independent organizations, particularly where it was felt that operations were too scattered for them to conduct their work individually. With such a procedure established, it would be practically the same set-up as enjoyed by the major company with its safety department. Thus, it might be possible to have a safety director for the group, and both meetings and posters could be used.

First of all, such cooperate interest and support should be on a basis of mutual reciprocation of significant experiences; that is, a group of independent operators could form a pool of their safety exeriences and from such all could equally share in the educational benefits that could be derived therefrom.

Safety measures to serve their

YOU NEED "ALL THREE"



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. . . are made in three patterns to meet varying field conditions of depth and volume. Material selection, treatment, and workmanship are so carefully controlled that the original extremely close, uniform fit between plunger and tube is maintained for a much longer period. Hence, slippage is retarded, maintenance cost is reduced, and pulling jobs are few and far between. Ask for the facts about the "Volume Producer," the "Producer," and the sturdy, low-cost "Petrol A"—the quality pump for stripper wells.

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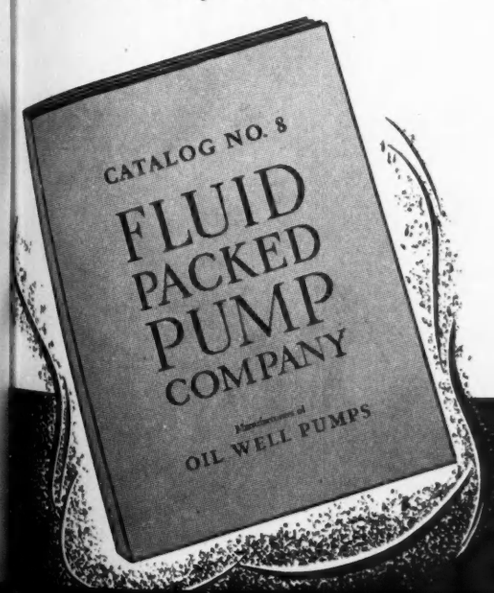
Flupaco Tubing Liner Pump *Flupaco Groove Seal Pump* *Fluid Packed Pump*



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[*Continued from page 38*]

most profound purpose must be developed in accordance with the practical aspect of oil field operations. Thus, through the facilities of such an aforementioned "experience pool," which would be analogous to an organized research institution, one would be able to follow the trend of current safety conditions within actual field operations. From such an accumulated volume of experiences contributed by the many participating operators, the safety instructor would have the necessary material from which pertinent and timely safety training measures could be developed.

Thus it can be seen that it does not require an elaborate safety organization for the small producer to do some constructive work along this line. With a little advance preparation he can not only reduce his frequency, but can weld his organization into a closer knit group, with less danger of outside encroachment. Perhaps at times he will manage to serve a few inexpensive refreshments at his meetings, but whatever he does, the ultimate benefits he will reap will far repay any minor expenditures he may have made in the work.

The program itself can be carried on in many ways, using all or any one of a number of attacks. However, it should be stated here, that before the program can hope to accomplish anything definite or constructive, the operator himself must be thoroughly sold on the idea. Furthermore, results should not be expected overnight, for like the small child just finding his way about, many mistakes will be made and not a few fingers burned in the process of getting adjusted to any adult training program, and this safety work, for some reason, takes time to really "sell."

A high official in one company recently stated to a group of his foremen that the safety program had developed into such an important part of the regular routine work, that the value of each individual foreman to the company depended in a large measure on that foreman's attitude, cooperation and record in reducing the accident frequency. This executive realized that only by selling the foreman on the idea and keeping him everlastingly working at it, could the program succeed in his department.

ums; it merely represents in dollars and cents the cost of an exceedingly high number of deaths and hundreds of permanent or partial cases of physical disability.

Two million dollars a year is certainly far too great a price to have to pay for broken bones, wrenched backs, and like injuries, especially when in many instances those men could and should have been trained to avoid the very thing that occurred.

Accompanying tables present the oil industry's compensation insurance experience in the State of Texas in a three-year period.

Table 3 supplies impressive figures in which the oil industry's record is compared with other businesses, and clearly points out the need for additional safety oil field work. Of all the industries operating in Texas, within the period of one year 42.3 percent of all industrial deaths occurred within just two branches of the petroleum industry. Ninety-three employees engaged in drilling and producing operations in Texas were killed during the year 1935.

A $5000 Avoidable Accident

A few examples clearly show how avoidable accidents are both expensive and painful.

A fireman on a drilling rig, who at the age of 55 had been working in and around oilfield operations for some 15 years had a very serious and painful injury. The boilers which he was tending were being fired with natural gas. Just prior to the pulling of a swab from a well which was being brought in, the fires in the boilers had been put out for good and satisfactory reasons. During this swabbing process, a fine spray of oil and gas pervaded the area around the drilling rig floor as well as the atmosphere around the location. The fireman was on the derrick floor when the swab was being pulled, and as a consequence his clothing became saturated with oil and gas. After the swab had been pulled for the last time and the atmosphere permitted to clear up, the fireman attempted to re-light the fires under the boilers.

This particular fireman had not given much thought to the fact that his own clothing was dangerously saturated with oil, and that the slightest contact with an open flame would likely set them on fire instantly. While this was one element of cause for his injury, there are still others that must be considered in order to develop an instructive medium of safety training.

There are both safe and unsafe methods for lighting fires under oilfield boilers. The fireman in question chose an unsafe method. That is, he wadded up a small piece of paper which he intended to set on fire and toss into the firebox to ignite the gas. A strong wind was blowing, thus he needed a shield from the wind to light the crumpled paper. He decided to use the opened firebox door for this purpose; this close position would also enable him to toss the lighted paper into the firebox without the wind blowing the paper away. The

TABLE 2

Compensation Insurance Experience in the State of Texas

Data Computed from the records of the National Council on Compensation Insurance and which deal exclusively with the Manual Classification: "Oil Producing—Operation of Oil Leases," in the State of Texas.

	1933		1934		1935	
	Earned Payroll	Earned Premium	Earned Payroll	Earned Premium	Earned Payroll	Earned Premium
	$23,361,826	$875,931	$28,344,791	$1,156,100	$28,436,686	$1,165,690
Class of Injury	Number of Claims	Losses Incurred	Number of Claims	Losses Incurred	Number of Claims	Losses Incurred
Death	27	$104,610	33	$130,881	36	$188,788
Permanent Total	6	32,311	5	16,159	1	4,053
Major Permanent	50	103,951	51	122,690	46	119,261
Minor Permanent	140	68,692	163	86,151	191	86,642
Temporary	723	82,820	819	92,672	824	95,804
Total Medical	....	122,988	....	135,381	....	130,105
Total	946	$515,372	1,071	$583,934	1,098	$624,653

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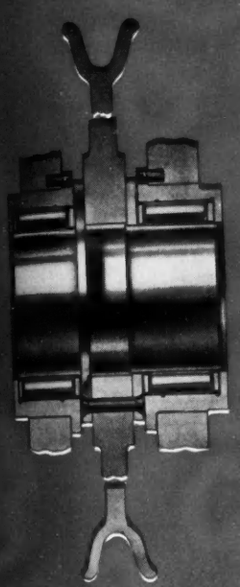

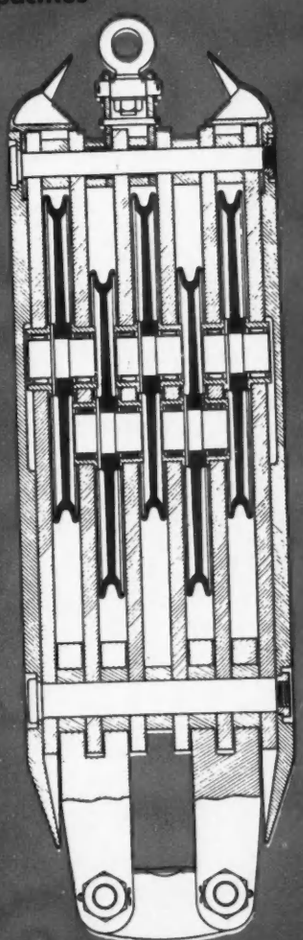

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next error that was made was that he opened the gas control valve which permitted gas to flow into the firebox before the ignited paper was thrown in. The fireman's final act in line of duty was that, after the control valve had been opened, he stepped close to the firebox door, lit several matches and finally ignited the paper and tossed it into the firebox. The lapse of time required for him to light his paper torch permitted an excess of gas to accumulate in the firebox, and the moment the lighted torch was tossed in, the flame flashed out with the speed of lightning and thereby igniting the fireman's clothing instantly, due to their saturated condition. The wind and oily clothes greatly accelerated the serious extent of the burns the fireman suffered. His fellow-workers were able, however, to smother the flames before they produced a fatality.

There are two very constructive safety thoughts to be derived from this particular incident: First, it is important that one should not wear oily clothing when in the vicinity of open flames; or, for that matter, one should not wear them any longer than it is possible to get into dry clothing. Second, it is important that when starting a gas fire, the starting torch should be tossed into the firebox before the control valve has been opened.

The misery and pain that this fireman endured, plus his eventual inability to return to his old job, is something which our standards of valuation produce but a poor attempt when it comes to showing a relation of such in dollars and cents. Nevertheless, the insurance carrier for this man's employer paid out in benefits to the injured fireman something over $5000. The employer eventually paid the $5000, plus the administrative expense of his insurance carrier for handling the matter for him. But does this, from the angle of humanitarian fairness, relieve the employer of the responsibility to see that his personnel understand what is required of them to be able to avoid accidents?

A Costly Delay

In the following paragraphs there is an analysis of an accident which could have been prevented had there not been a delay in performing a necessary mechanical correction; or, secondly, had the improperly functioning device been decommissioned from further service until repairs could have been made, the source of the cause for the accident would have been removed.

A driller's helper, who at the age of 30 had been working in and around oilfield operations for seven years received a very serious hip and back injury.

A clear understanding of the cause for an accident cannot be had unless events which lead up to the actual injury of a person are brought into the discussion. Two days prior, the driller's attention was called to the fact that the automatic cathead was not functioning properly. In other words, the spring on the pull-cable which was supposed to re-set the cathead to a "pulling position" after each pull was not performing its designated purpose. This situation brought about the necessity for the driller's helper to re-set the automatic cathead by hand; or rather, he pushed on the handle of the tongs and the attached cable naturally revolved the cathead back into its normal "pull position." But, on occasions when this act was performed just at the moment the cathead rotated

Table 3
RELATIVITY TABLE

"Data Table" showing relationship between accidents which have occurred in Oil and Gas Well Development and Production Operations, and accidents which have occurred in all assured industries (compensation insurance) in the State of Texas.

*Total amount of compensation and medical benefits incurred as losses to approximately 66 Compensation Insurance Carriers during business in the State of Texas for the fiscal year (9-1-37 to 9-1-38)	$9,971,715
**Total amount of compensation and medical benefits incurred as a specific loss to Insurance Carriers who insured the risks on Oil and Gas Well Development and Production Operations only in the State of Texas during the Policy Year (1935) Development: $1,417,758; Production: $624,653	$2,042,411
The percent the oil and gas well development and production operations shared in the loss of all combined industries was	20.4%
*Total number of deaths reported as occurring in all industries in the State of Texas during the fiscal year (9-1-37 to 9-1-38)	208
**Total number of deaths reported as occurring in Oil and Gas Well Development and Production Operations in the State of Texas during the Policy Year (1935) Development: 57; Production: 36; Total	93
The percent the Oil and Gas Well Development and Production Operations shared in the total number of industrial deaths in the State of Texas was	42.3%
*Texas Employers subscribing to Workmen's Compensation Insurance (all classes of industry) ('37-'38); estimated	26,000
*Number of employees in the State of Texas protected by Compensation Insurance ('37-'38); estimated	400,000
*Number of injuries per year ('37-'38); (an average of 390 per day)	117,000

**National Council on Compensation Insurance—Records of the Insurance Commission, State of Texas, Austin, Texas.

*Biennial Report—Industrial Accident Board, State of Texas, Austin, Texas.

NOTE—It was difficult to get complete detailed records of corresponding years in making this comparison; since a 1935 Policy Year may include an experience which occurred late in the year of 1936, we concluded since the Fiscal Year employed here began on September 1, 1937, there would not be sufficient discrepancy to interfere with a fairly accurate picture on the relationship of accidents.

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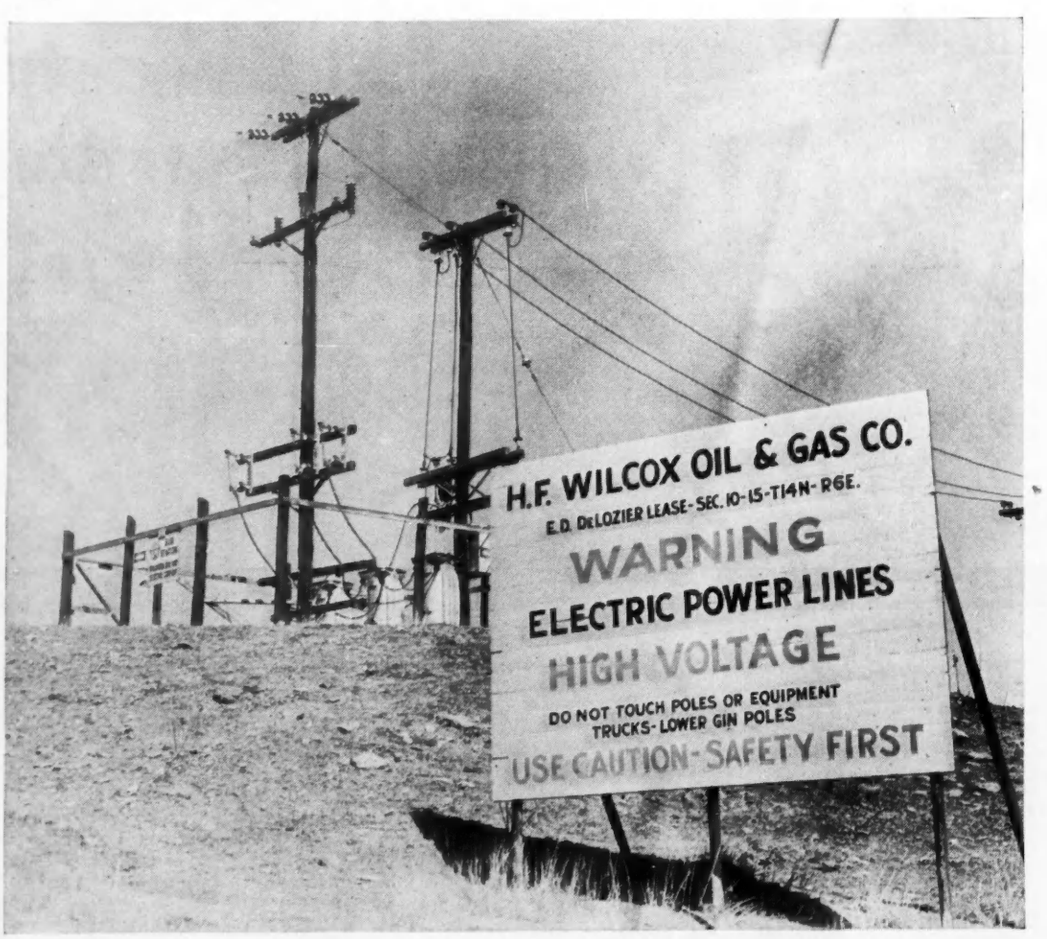
back into its normal position, the trigger-clutch inside the cathead would grab and cause a sudden tremendous pull on the handle of the tongs.

The driller, on being informed of this existing hazard in connection with the cathead, cautioned his helper to be careful and not be caught in between the tongs and the pipe stand. The driller also explained that he would try and get someone from a machine shop to make the repairs as soon as possible. These two assertions seemed to satisfy the driller in that he believed he had done all within his power to prevent an accident in connection with the improperly functioning cathead.

Two days after attention had been focused on the condition of the cathead, the driller's helper was still employing caution when it was necessary to re-set it. No repairs had been made up to that time, and the tongs had not been taken out of active service in anticipation of someone possibly being injured. The pipe-racking platform was crowded with stands of drill pipe, and in order to re-set the cathead the helper had to step around in front of the racked pipe which placed him in between the pipe and handle of the tongs. He tried to avoid getting too near the end of the tong handle, for the nearer the end he knew the greater was the possibility of his being crushed should the trigger-clutch grab while he was in that particular spot. On this one occasion, however, the tong handle was unusually hard to push back and thus re-set the cathead; so, the helper moved slightly nearer the end of the handle that a more direct pull on the cable could be made. At the precise instant the cathead revolved back into a "pull position," the trigger-clutch grabbed and instantly reversed the motion of the tong handle. This action was far too instantaneous for the helper to get in the clear, thus he was pinned in between the pipe and the tong handle.

Here is another situation which resulted in an oil field employe having to undergo untold agony because the proper steps of prevention were not instituted at the proper time. Some idea might be had as to the mental and physical misery this man endured by knowing that the medical expense attending his treatment was $740. The Industrial Accident Board awarded compensation benefits totaling $4920. These two items of expense brought the total cost for the delayed mechanical correction up to the sum of $5660. The carrier of the compensation insurance for this man's employer paid this amount; but, in the end the employer paid the same amount, plus a proportional part of the administrative expense of his carrier.

Here is a case where a man, in trying to help keep the work progressing according to the interpretation of his driller, suffered a major permanent disability—perhaps, to such an extent that he will never be able to work again on a job of his own choosing. True to the form of being sufficiently impressed of the need for improvement after the damage has been done—the driller immediately suspended all operations until the cathead was repaired to a first class working order.



New Methods Clean Out Wilmington Wells Faster

By JOHN C. ALBRIGHT

DUE to the unconsolidated nature of producing sands in the Wilmington townsite field, and the Los Angeles-Long Beach Harbor area, difficulty is encountered in keeping the wells on production. Not all of the wells which are flowing, or being pumped from the top sand (Ranger) are affected by sand difficulties, but such a large portion of them require cleaning out that special methods have been developed to cut down the time of this operation.

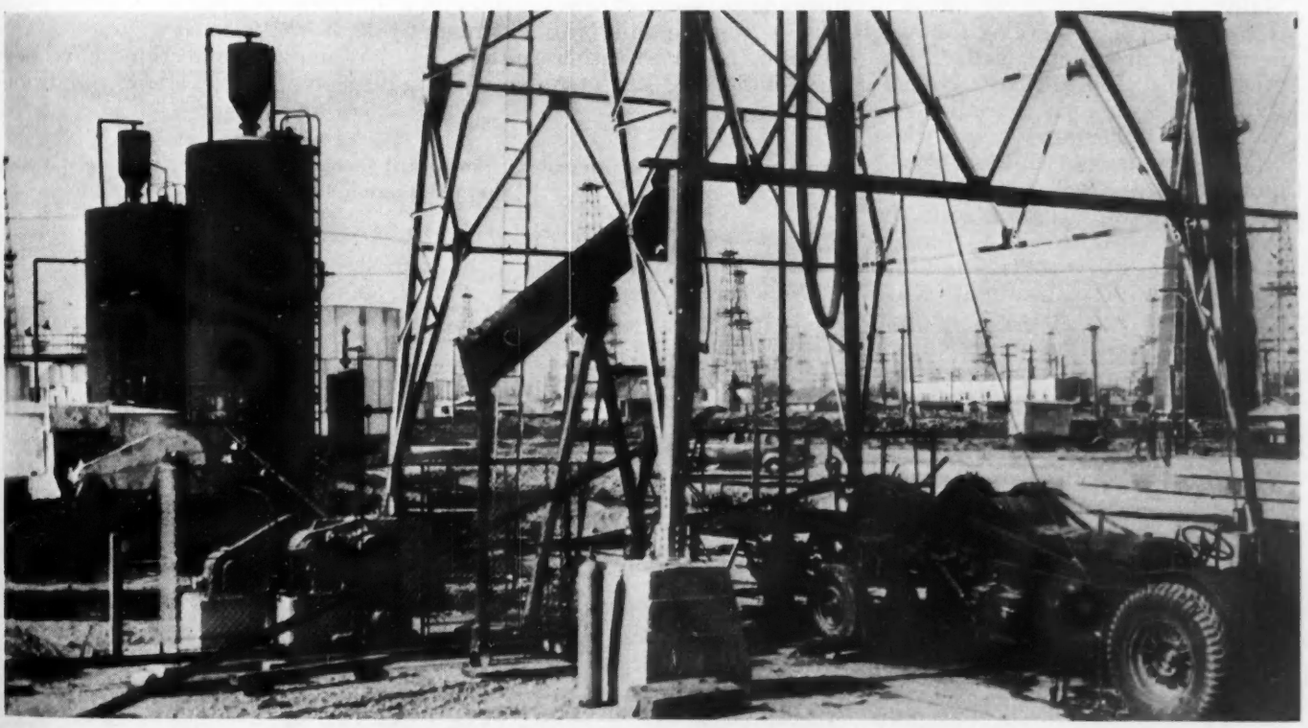
Sunray Oil Company came into the area in January of 1938, taking over a considerable section of the Wilmington area and has drilled wells on both sides of Anaheim Street; some of which are producing from all three sands, the Ranger on top, the upper and lower Terminal in position as above given. Oil from the Ranger is accompanied by sand in quantities, sometimes as much as 25 percent of the volume of fluid lifted. Tubing is hung in the well, when producing from this zone alone, so the working barrel takes suction from the top of the fluid level. In flowing wells the tubing is placed as high as possible to avoid sanding up, and to produce the minimum amount of gas.

Frequently a well, whether pumping or flowing, bridges below the tubing, caused by sand packing and under pressure, being squeezed into a hard, compact ball, said to be much dryer than the sand on top of the ground. Whether this occurs or sand is carried from the producing zone through the perforations in the liner matters little, because the obstruction must be removed if the well is to produce its quota. Equipment formerly used in this field required almost a full week of work to recondition.

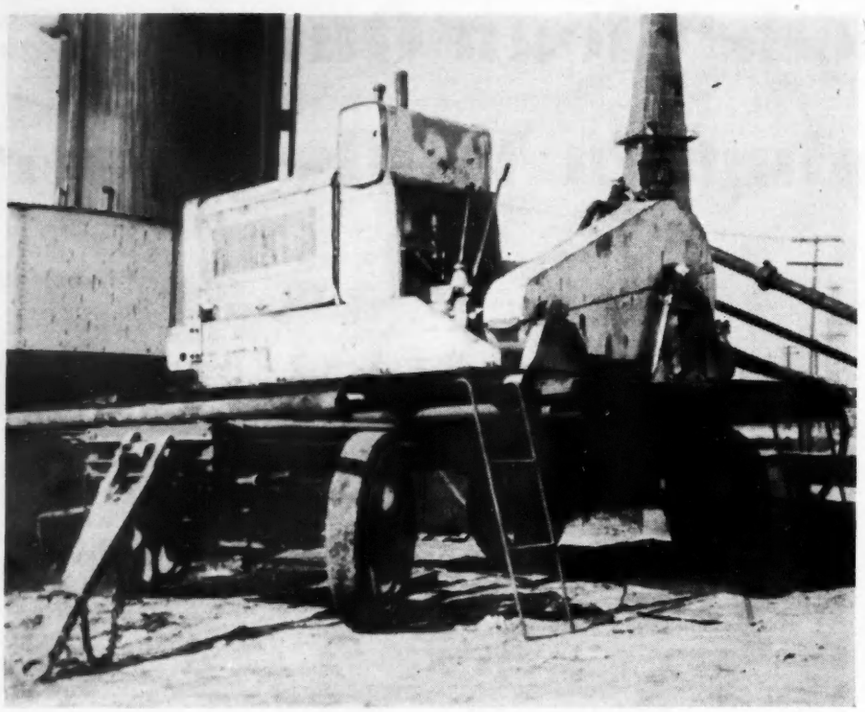
New Clean-Out Method

Newer methods have been developed, however, which require on an average of only 48 hours, from the time the well is opened until it is back on the line and making oil. This method requires a boiler. Frequently no boiler is set closely enough to pipe steam to the well. In this case, a boiler mounted on a truck trailer chassis is used.

A conventional tubing- and rod-pulling machine is used to remove these strings from the well, and a gasoline engine-driven pump mounted on a trailer is used for



Well in Wilmington field which has sanded up and is being cleaned by circulating hot oil down through the tubing, bringing out accumulated sand and shale through annular space between tubing string and casing. Well Sunray Oil Company with sand traps in left background.



Trailer mounting of gasoline engine and pump for circulating hot oil through tubing when cleaning wells in Wilmington of accumulated sand.

circulating in the well. A blowout preventer is installed on the casing head, if none is already in use, so the tubing may be removed from the well without spraying oil over adjacent property.

In the first operation, a portable working platform is set at the well. Made almost entirely of steel, it is constructed in sections for ease in moving from one well to another. This platform has two substructural supports, similar to overgrown carpenters saw horses, but welded from two-inch tubing and braces of steel rods. Each of the supports are separate from the other, but designed as to dimensions so that other parts fitted into them make a substantial work platform having strength enough to take any kind of punishment required while cleaning out the wells. The longitudinal cross member of each support has a short nipple welded at the extremities to accomodate the guard rails placed from one support to another when assembling. The side rails, parallel to the supports on the side opposite to the service ladder are made to slip into slotted racks to hold them rigid and in a safe position for protection of workers. The floor is made in sections with steel ends so a turned down edge slips over the supporting member longitudinal bar, with only sufficient length for a press fit. A steel ladder on the service side with a short upright guard completes the working platform.

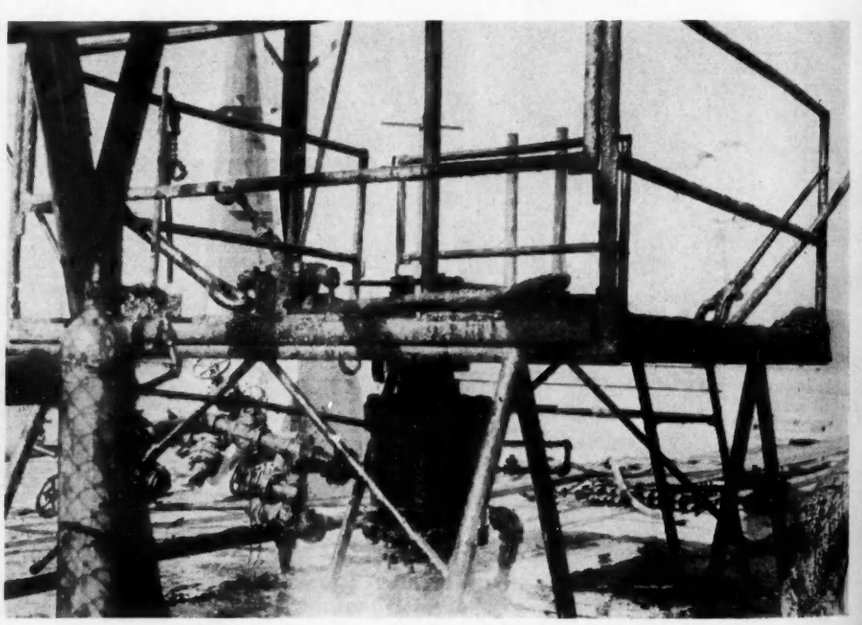
On a pumping well the unit is disconnected in the usual manner and the Christmas tree and other fittings removed so the blowout preventer may be installed on the casing flange. The type head employed by Sunray Oil Company has a compressible rubber inner section, operated either with gas or compressed air. On leases at Wilmington, the heads are connected to cylinders of carbon dioxide gas, which are convenient to handle and release gas as required to expand the inner section against the tubing as it is run out or into the well.

As the tubing and rods are being removed from the well, the portable driven pump is connected to a tank of oil which has been heated with steam coils placed in the tank. As the work is carried out in a systematic manner, the various operations are conducted so the oil is at the required temperature, from 180 to 220° F., to be used for cleaning out the accumulation of sand in the well.

After the working barrel and packer have been removed the string of tubing is again run into the well until the lower end is into the sand, or has touched the bridge. At this time, a joint of tubing stands up in the derrick, connected at the upper end to a light swivel similar to the larger units used in drilling with rotary tools. A hose is connected in a manner similar to a rotary drilling hose to the swivel, and to the discharge pipe leading from the pump on the trailer beside the well, which has in the meantime been operating by pumping hot oil from tank to sump, or from the tank back into the tank through a manifold to insure proper volume of fluid and other working conditions.

When all connections have been inspected, and other conditions

Working platform developed by Sunray Oil Company to use in cleaning out wells in the Wilmington field.



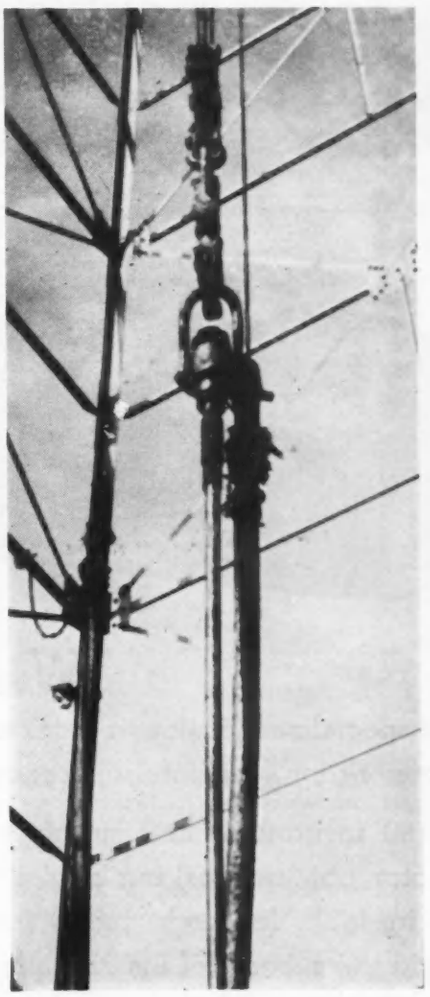
favorable, the hot oil is begun circulating down the tubing into the well at the maximum volume the pump will deliver. The impact of the hot oil against the bridge soon breaks it down, and washes out the cuttings with oil that flows from the well head through a return line to a sump at the flow tank battery. Sand invariably lies below the bridge, or sand-up conditions may have been responsible alone for the cleaning out operation, which is also brought out with the circulated oil. As the cleaning-out progresses, and sand is floated out of the hole, joint after joint of tubing in singles only, are run consecutively down the well to remove the obstruction from the hole progressively.

Hot oil is used due to the extreme viscosity of cold oil, which if used by the circulating pump would require a considerably higher discharge pressure than the hot oil. It is believed, also, that the hot oil has a greater dissolving force upon the sand because, perhaps, of its lowered viscosity. At any rate, the oil is used as hot as it is possible to prepare it in open tanks without excessive vaporization, with fresh oil, free of floating sand as rapidly as it is used by the circulating pump.

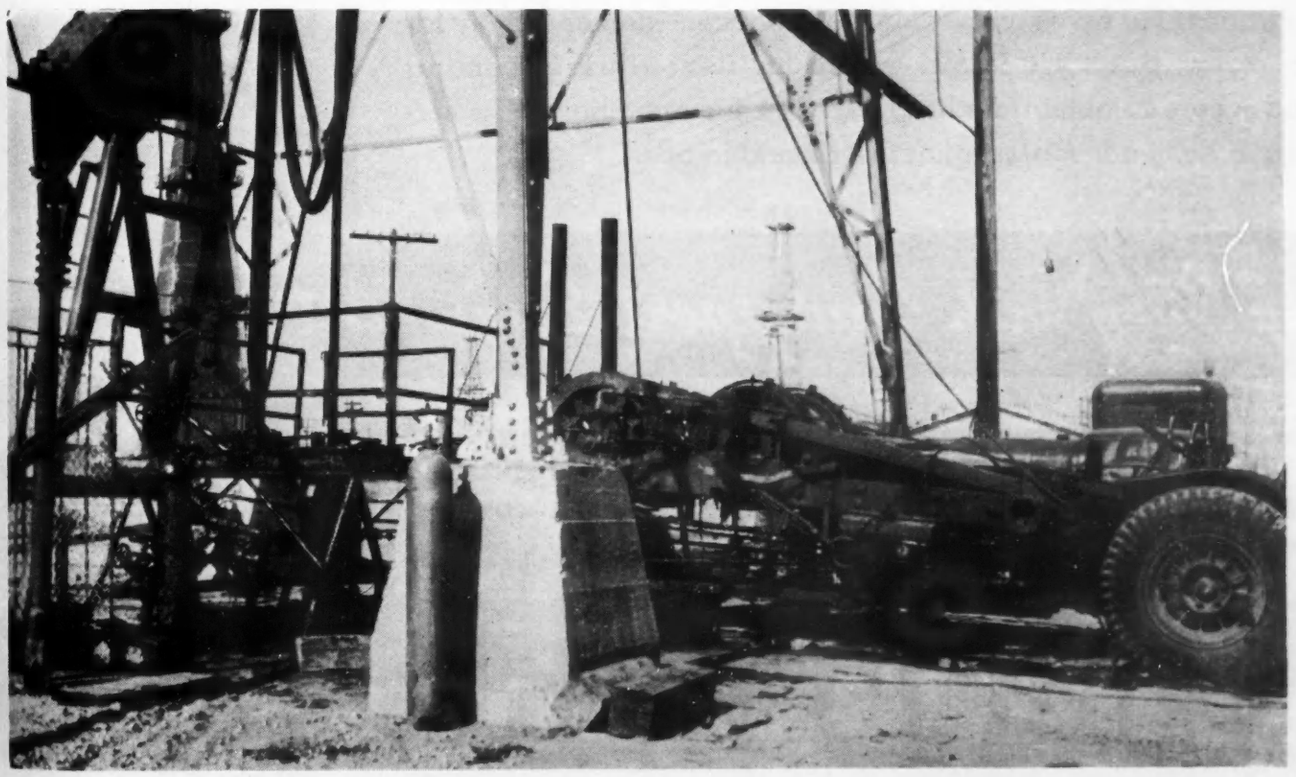
Whether or not the returns from the well are delivered to the excavated and concreted sump at the tank battery, or the sand traps in the treating units depends largely upon the condition of the oil. If a greater percentage of the returns consist of sand, the stream is directed into the sump where the sand settles fairly readily from the hot oil. If oil predominated, the returns are directed into the sand trap with the oil treated by the process in use to settle out the sand and reduce the emulsion.

After the bottom of the hole has been reached, and the production of sand has been reduced to the average percentage observed at the particular well, the entire string of tubing is pulled from the hole and laid down for inspection.

Some times wells will produce for several months without cleaning out, but with others the process must be repeated perhaps as often as each 20 days. The time consumed in reconditioning a well with hot oil depends upon the well; if every operation functions as expected, the job does not exceed 48 hours. At other wells, the time may be reduced to 24 hours, but, it is said the overall process may be accomplished in about 25 percent of the time required when a string of tools are used, with a bailer bringing the sand from the hole as it is cut with the bit.



Tubing block, swivel and hose used in cleaning-out operation.



Pulling machine used by Sunray Oil Company in the Wilmington field to remove tubing and rods for servicing and cleaning out.

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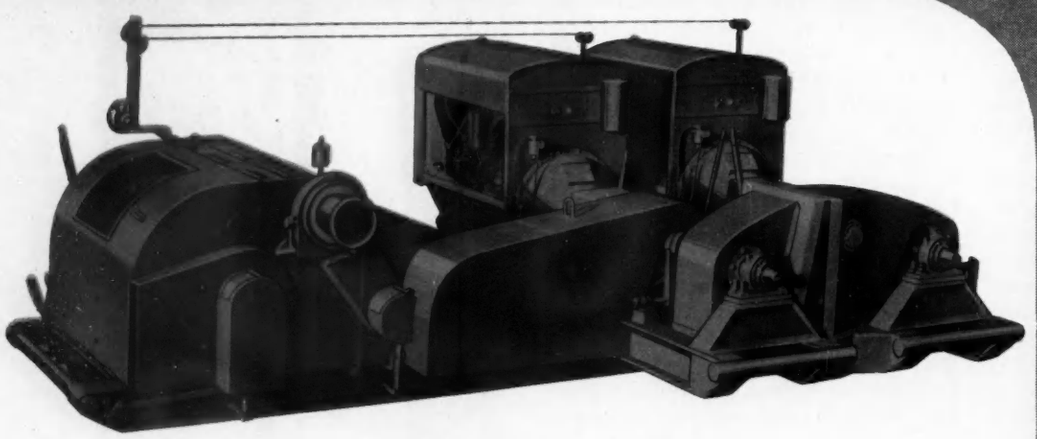

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MEN IN THE INDUSTRY'S NEWS

JOHNSTON de FOREST, New York attorney, has been named to the directorate of Tide Water Associated Oil Company to fill the vacancy created by the death of his uncle, Henry W. de Forest.

ASHER E. SERVICE, of Service Drilling Company, and Mrs. Service, have moved from Big Spring, Texas, to Covina, California.

CLAUDE C. O'NEAL, 51, civil engineer for Lone Star Gas Company, Dallas, died March 22 in a San Angelo hospital. He was stricken while engaged on a gas project near the latter city.

JACK VAUGHAN, land man for Sun Oil Company, has been transferred from Hattiesburg, Mississippi, to Baton Rouge, Louisiana.

C. L. HIGHTOWER, safety director of United Gas Pipe Line Company, Houston, Texas, will serve the production division of the A.P.I. as chairman of the committee on fire prevention.

R. A. STEFANESCU, formerly with Romana-Americana in Ploesti, Roumania, is now with Humble Oil & Refining Company of Houston, studying drilling and production methods in the Gulf Coast. Stefanescu is a graduate of Scoala Polytechnica din Bucharesti.

JOSEPH GLASS, New York, president of Midstates Oil Corporation, and N. T. Gilbert of Tulsa, general manager of the corporation, are making an inspection tour through Texas.

E. L. NEWTON, independent operator partially responsible for drilling the Birk City pool discovery well in western Kentucky almost a year ago, is vacationing in Florida.

ORVILLE H. McCLELLAND was elected a director of South Penn Oil Company during the company's annual meeting held in Pittsburgh. He succeeds the late Frank J. Huffman. No change was made in the officers, who are: P. H. Curry, president; C. B. Turner and C. F. Stevenson, vice presidents; J. L. Hays, secretary, and T. B. Judge, treasurer.

E. E. SWIFT, Allen Davis and E. O. Goodson last week organized Del Mar Drillers, Inc., as a Texas corporation with headquarters in Corpus Christ.

F. F. REEVE, Calgary, is president of Commonwealth Drilling Company, Ltd., which was organized last week as a wholly-owned subsidiary of Commonwealth Petroleums, Ltd., Alberta producing company. Other officers are A. B. Mackay, vice president; G. J. McKay, secretary, and G. T. Wright, manager.

HARLEY BYRD, western Kentucky operations supervisor for Sun Oil Company, has been placed in charge of an office opened by the company in the Masonic Building at Henderson.

HOWARD P. HOLMES, W. K. Powell and M. S. Church last week organized the Basin States Oil Company with headquarters in Dallas.

E. G. DAHLGREN will resign April 15 as technical director of the proration division of the Kansas Corporation Commission. He took the place temporarily March 1, when T. A. Morgan became director. Dahlgren was director for two years and previous to this was with the Oklahoma Corporation Commission at Oklahoma City.

ERNEST E. PYLES, chairman of the Emergency Executive Committee which has been urging further oil curtailment in California the last three months, has been offered the position of production manager for the Long Beach Oil Development Company which will exploit 270 acres of tideland property owned by the City of Long Beach. The development program calls for the drilling of no less than 75 to 100 wells. Work is slated to get under way immediately following survey and other necessary preliminary details.

M. SCHLUMBERGER, president of Schlumberger Well Surveying Corporation, has been in Houston for three weeks on an inspection tour of the gulf coastal area. With Schlumberger is Paul Primat, another official of the firm.

H. P. McLEOD, Calgary, was re-elected president of Okotoks Oil & Refining Company, Alberta company. Also renamed were Irwin Blight, vice president; Matt Ingles, secretary-treasurer, and Joseph Dwights, Fred Thomilson and Phillip Quinton, directors.

L. L. ROBERTS, Kilgore operator, is locating in Evansville, Indiana.

BOB GARLAND, independent operator and head of Arab Petroleum Corporation, returned to Evansville last week from a visit to Tulsa.

SOL SILVER and Louis Berman, both of Evansville, Indiana, and Roy Beard of Owensboro, Kentucky, last week organized Aladdin Oil Company, Inc.

E. W. KOLB, secretary of the Alberta Petroleum Association, returned to Calgary last week from Toronto and other east Canadian centers.

LEON F. ROSS and John R. Black, both of Dallas, Texas; William H. Bonner of Houston, and George Frankel of New York, last week organized Columbia Pipe Line Company of Magnolia as an Arkansas corporation.

S. MYRON ZANDMER, president of Terminal Oil Company, Ltd., was expected to return to Coutts, Alberta, last week from Vancouver.

RAY RYAN, independent operator currently active in southern Indiana, was in Hot Springs, Arkansas, last week recovering from the flu.

T. R. MURTHA, chief accountant of Atlantic Refining Company, Dallas, Texas, talked on "Budgeting for an Oil Company" at a meeting of the Houston chapter of National Association of Cost Accountants on March 22.

E. A. SHEA, of New York, executive vice president of Tidewater Associated Oil Company, was in Houston last week.

DR. GABRIEL E. GOMEZ, C.E., has been appointed head of the department of petroleum of Colombia at Bogota, succeeding Dr. Cesar Pedraza, resigned.

VICTOR WENZEL, Shreveport, Louisiana, has returned from an extended tour of South America, including visits to Brazil, Argentina and Chile. He was joined at Buenos Aires en route home by D. P. Hamilton, president of Root Petroleum Company, Shreveport.

HAROLD B. FELL, executive vice president of the Independent Petroleum Association of America, addressed a district meeting of the association at Shreveport March 24. B. A. Hardey, vice president for North Louisiana, presided. The meeting, in the form of a luncheon, was arranged by R. G. O'Brien, C. H. Lyons and W. G. Ray.

J. J. PERKINS, Wichita Falls oil operator and civic leader, has donated $30,000 for the construction of a residence building for girls at the Methodist Home, Waco, Texas.

EMBY KAYE, head of the gas recycling plant operations of Tide Water Associated Oil Company and Seaboard Oil Corporation, with headquarters at Dallas, departed March 21 by plane for Atlantic City, N. J., upon receipt of word of the sudden death of his father in the latter city.

E. B. GERMANY, Dallas, Texas, oil operator, will be the guest of honor at a banquet in Houston April 1. The banquet will be an expression of appreciation for Germany's services as Texas state Democratic chairman.

ADAM GRAFE, Dallas, Texas, independent operator, was a visitor in Houston last week.

DIED:

J. G. HANKS, 70, retired general superintendent of East Ohio Gas Company, died March 14 of pneumonia at a Cleveland hospital. He resided in Cleveland Heights. Qualifying for a pension in 1934 from the above company, he remained active and became associated with the S. J. Brendel Interests, Pittsburgh, Pa., in acquisition and development of oil properties in West Texas.

FRED E. HAYNES, 58, who drilled a series of wildcat tests that contributed to the discovery of the Flag Lake pool, East Texas, died March 17 from gas asphyxiation at his Plano home, near Dallas.

BLAND PROCTOR, 47, general counsel for Great Lakes Pipe Line Company, with headquarters at Kansas City, died March

17 at Victoria, Texas, where he had been ill for several months at the home of his mother. He was a World War veteran, serving as a machine gunner in France, and later with the Army of Occupation in Germany. He was an attorney for Marland Oil Company of Texas and later Continental Oil Company at Fort Worth before entering the services of the gasoline pipe line company.

ERNEST R. FAIN, 49, president of Fain-McGaha Oil Corporation, Wichita Falls, died March 18 of a heart ailment in a Dallas hospital, where he had been confined for a month. He was an ardent polo player, having a stable of ponies rated among the best in the Southwest.

H. L. HAMAKER, 74, died at Los Angeles, California, on March 15. He is the father of Rex G. Hamaker, vice president and general manager of Reed Roller Bit Company. The funeral was held on March 18. The elder Hamaker was an artist of note, and devoted his later years to painting.

Eastern A.P.I. District program announced

The Eastern District of the American Petroleum Institute Division of Program will hold its spring meeting April 4 and 5 at the William Penn Hotel, Pittsburgh, Pa.

The preliminary program follows:

TUESDAY, APRIL 4, 1939
10:00 A.M.

"Oriskany Sand Development in West Virginia and Oil and Gas Possibilities In It and Deeper Horizons."
Paul H. Price, West Virginia State Geologist, Morgantown, W. Va.
Discussion by:
J. E. Billingsley, Geologist, West Virginia Gas Corporation, Charleston, W. Va.

"Recent Developments in the Oil and Gas Industry in Michigan."
Harold McClure, president, Michigan Oil and Gas Association, Alma, Michigan.
Discussion by:
Dr. Virgil R. Kirkham, Saginaw, Michigan.

1:30 P.M.

"Progress Report on Developments in Southern Illinois and Adjacent Territory in Western Kentucky and Indiana."
Theron Wasson, chief geologist, The Pure Oil Company, Chicago, Ill.

"Dehydration of Natural Gas."
H. M. Baker, superintendent, Compressor Division, United Fuel Gas Company, Charleston, W. Va.

"High Pressure Gas Transmission."
John Clarke, engineer, Hope Natural Gas Company, Clarksburg, W. V.

7:00 P.M.
Annual Dinner and Entertainment.

WEDNESDAY, APRIL 5, 1939
9:30 A.M.

"Improvements to Chemical Treatments of Oil and Gas Wells."
P. E. Fitzgerald, geologist, Dowell, Inc., Tulsa, Oklahoma.
Discussion by:
B. B. Wescott, Gulf Research & Development Company, Pittsburgh, Pa.

"A Review of Illinois Basin Operating Problems."
Ralph E. Damp, production superintendent, The Carter Oil Company, Mattoon, Ill.
Discussion by:
R. W. McIlvain, Jr., division manager, The Pure Oil Company, Olney, Ill.

"Modern Methods Applied to Cleaning Out and Drilling Deeper."
John A. Thompson, chief engineer, Belmont Quadrangle Drilling Corporation, Bradford, Pa.

1:30 P.M.

"Oil and Bearings."
R. J. S. Pigott, staff engineer, and P. G. Exline, lubrication engineer, Gulf Research & Development Co., Pittsburgh, Pa.

"Production Flooding Efficiency."
Harry M. Ryder, Ryder-Scott Oil Producers, Bradford, Pa.

"A Critical Survey of the Geochemical Methods of Prospecting for Oil and Gas."
Sylvan Pirson, head, Dept. Petroleum & Natural Gas Engineering, Pennsylvania State College, State College, Pa.
Discussion by:
A. J. Teplitz, Gulf Research & Development Company, Pittsburgh, Pa.

Report of Nominating Committee and Annual Election of Officers.

Expect record attendance at gas measurement conference

Southwestern Gas Measurement Short Course will be held at Norman, Oklahoma, April 18, 19 and 20, with a complete three-day program of papers and discussion of problems pertaining to measurement, control and regulation of natural gas. Following general sessions Tuesday morning, engineering papers will be presented and discussed in College of Engineering building, University of Oklahoma. These, and those to follow during the next two days will cover accounting, charts, calorimeters, equipment, gas laws, wells, gravity, integration, laboratories, measurement and regulation, meter men, meter shop practice, meters, provers, pulsating flow, regulators and the use of the slide and gas rule. Wrinkles having to do with gas operation and maintenance will be a round-table discussion. Program for 1939 includes subjects in addition to those brought up to date from the 1938 Conference, according to Fay C. Walters, Panhandle Eastern Pipe Line Company, program chairman.

In addition to the papers presented at this, the fifteenth annual conference, new and improved equipment will be displayed by manufacturers. New units will be explained as to operation with improvements being detailed. The conference is sponsored by College of Engineering, The University of Oklahoma, and assisted by Corporation Commission of Oklahoma, Railroad Commission of Texas, Kansas Corporation Commission, Oklahoma Utilities Association, Natural Gas Section, American Gas Association, and Natural Gasoline Association of America. L. G. Rheinberger, Sinclair Prairie Oil Company, Tulsa, is chairman of the 1939 general committee. In view of past interest it is expected that the conference will set a new record in attendance.

Oklahoma City operators form engineering committee

Operators in the Oklahoma City Wilcox pool have organized an association known as the "Oklahoma City Wilcox Secondary Recovery Association," the purpose of which is to make a complete and comprehensive study of the Wilcox reservoir in the Oklahoma City field with the view of possible application of secondary recovery methods in this field.

C. V. Sidwell of Tulsa, formerly with the British American Oil Producing Company at Oklahoma City, has been selected as chairman of this association's engineering committee. This committee is similar to other pool engineering committees which have been formed in Yates, East Texas, Goldsmith, and the North Basin Engineering Committee in West Texas except that this is probably the first engineering committee ever formed by operators to study a secondary recovery project.

The engineering study is to be financed by the operators on a per-well basis and will probably require a year to complete before any definite conclusions will have been reached by this group.

Data will consist of approximate recoverable oil now in place, reservoir pressures and temperatures, sand conditions and water analysis as well as other pertinent information on past performances of the field. The feasibility of using gas repressuring or water flooding as the medium of recovery will be determined after this survey is completed. Each has its possibilities in that there are very few shale breaks, though some gravel streaks, in the Wilcox zone, combined with the fact that either gas or water is available for both projects. As water flooding is rapidly assuming its importance in the Mid-Continent, particularly successful in the shallow fields of northeastern Oklahoma, careful analysis will be rendered this method. Repressuring by gas injection is now in use at South Burbank, Keokuk Falls, Billings-Wilcox and several other fields and should this type recovery be adopted, it will only increase its present status.

Mid-Continent district meets in Oklahoma City, April 18-19

C. O. Rison, of Indian Territory Illuminating Oil Company, has been appointed general chairman of the spring meeting of the Mid-Continent District of the American Petroleum Institute's Division of Production, to be held April 18 and 19 in the Skirvin Hotel, Oklahoma City.

Rison has appointed the following men as chairmen of committees which will arrange the program for the meeting:

T. J. Hamilton, Phillips Petroleum Company, Oklahoma City, chairman of the program committee; M. W. Birmingham, Indian Territory Illuminating Oil Company, Oklahoma City, chairman of the publicity and registration committee; H. R. Goodpaster, Kerlyn Oil Company, Oklahoma City, chairman of the entertainment committee.

THE WEEK'S NEWS SUMMARIZED

Allowables

Texas' producing oil wells will not be closed in on Saturdays during April, according to a new proration order issued last week. However, production will still be prohibited on Sundays, and since there are five Sundays during the month there will actually be only 3 days more production than in previous months.

This action, which surprised most operators and resulted in considerable criticism of the commission, resulted in boosting the state's allowable to 1,513,000 barrels daily. This is 145,000 barrels higher than on March 14 and is 101,300 barrels greater than the consumer demand as estimated by the U. S. Bureau of Mines.

The new order was made effective for only 30 days, whereas the preceding order was for 3 months. It thought likely the commission may reduce the output after the next statewide hearing, scheduled for April 19.

Meanwhile, the Bureau of Mines was announcing it foresaw a heavier demand for petroleum than any month since last September. It estimated a need for 3,434,000 barrels daily during April, 94,000 barrels more than in March although nearly 1 percent under actual demand in April, 1938. Motor fuel demand was expected to be 7 percent higher than in April, 1938, but exports are expected to be smaller for both refined and raw products.

California's curtailment plight was practically back where it started, following balloting on a 13-point program last week. From a barrelage standpoint, the recommendations were turned down, although the majority of operators approved it in principle. However, the Central Committee of California Oil Producers is urging further study of the movement.

Legislation

At a hearing on the question of federal ownership of off-shore oil lands last week, the Navy and Interior departments were subjected to vigorous attacks for their attempt to violate the sovereignty of the states. Efforts of the Navy Department to secure possession of California off-shore fields were stated to be based solely on the desire for an adequate oil reserve on the West Coast, which now has but 13 percent of the known unproduced supply. It was also pointed out that from a legal standpoint California was in a less fortunate position than Texas, the latter having reserved all its rights and lands when it entered the Union. Numerous Supreme Court decisions holding that the coast states own the adjacent submerged lands were cited by various state officials.

Last week the senate approved making the Connally hot oil act a permanent measure and sent it to the house of representatives, where it expected to be limited to a two-year period as it was two years ago.

Statistics

Excessive operation of wells and refineries gave an unfavorable trend to the industry's statistics the past week. Of primary importance was the substantial additions made to gasoline storage, which increased a million barrels to 87,291,000 barrels. At this level they are 6.8 percent under a year ago, but considerably above the 80,000,000 barrels considered as the maximum desired on March 31.

Gas and fuel oil stocks were reduced less than 300,000 barrels, and now stand at 130,371,000 barrels, or 6.8 percent larger than one year ago.

Crude stocks decreased 119,000 barrels, and are 10.7 percent beneath the level of a year ago at 272,852,000 barrels.

Crude runs to stills jumped 45,000 barrels during the week, and were 5½ percent greater than during the corresponding period a year ago. A total of 3,250,000 barrels were charged to stills daily.

Prices

Prices in the oil industry last week included gains for gasoline, while crude remained unchanged except in three minor instances.

Gasoline was up ⅛ cent in the Chicago territory, following earlier gains of that amount in Oklahoma-Kansas. Crude oil prices for three small South Oklahoma fields were reduced.

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Allowable Picture

Texas lifts Saturday shutdowns in April . . . Oil demand gain of 94,000 barrels foreseen by Bureau . . . California fails to agree on proration plan

Texas output may gain 145,000 barrels daily

Saturday shutdown of production in Texas, in force the major portion of the time since the spring of 1938, will be lifted during April, the Texas Railroad Commission having issued an order providing for shutdowns on Sunday only.

In previous months the state has been shutting in four Saturdays and four Sundays monthly. During April the order provides for the closing of wells on five Sundays, consequently there will be three additional days of production.

It is estimated that Texas' allowable, when the Sunday shutdowns are considered, will be 1,513,000 barrels daily during April. This is an increase of nearly 145,000 barrels daily over March, and is 100,300 barrels higher than the consumer demand for Texas oil during the month as estimated by the U. S. Bureau of Mines.

Of significance is the issuing of an order for 30 days only, whereas the preceding order (issued last December), was for the three months from January 1 to April 1. The new order also provides for the next statewide proration hearing to be held April 19.

Action Surprising

The abandonment of the Saturday shutdown came as a surprise to the majority of Texas operators, as testimony at the statewide proration hearing on March 15 had shown general opinion to believe the shutdowns should not be lifted at this time. Several oil men testified that the placing of this additional crude on the market would be likely to result in price reductions.

The action was being widely criticized by the majority of operators. However, some expressed the hope the commission might issue an emergency order reducing the output immediately following the next hearing on April 19.

The new order follows the program outlined by Commissioners Lon Smith and Jerry Sadler, who both announced prior to the statewide hearing held in Austin on March 15, that the Saturday shutdown would be abandoned, and possibly the Sunday shutdown would be abandoned during April of this year. Testimony at the statewide hearing indicated that the demand would be about the same as it had been for the first quarter of 1939. Subsequently, however, the Bureau of Mines announced that Texas consumer demand for April would be 1,412,700 barrels, which was 107,400 barrels higher than the current daily allowable after subtractions for the shutdowns were made.

In statements prior to the hearing, Sadler had said that he would see to it that special allowables were cut from several fields and that high allowables in the Gulf Coast, Southwest Texas and West Texas Districts would be reduced in order that the market might absorb six or seven days' production from other Texas fields.

This plan was abandoned. However, the commission's shutdown order provided that all special exemptions from the Saturday and Sunday shutdown orders for the first quarter of 1939 would expire automatically as of April 1. Sadler declared that the wells in every field must either close down on Sunday or reduce their takes by 1/7 during the course of the month. He insisted that there would be no exemptions to this rule. The reductions he proposed in the three districts listed above will be made on May 1, the commissioner said.

The following prepared statement signed by all three commissioners was issued with the order:

"This order permits the oil wells of the State of Texas to resume production on Saturdays during the five Saturdays in the month of April.

"It has been the custom of the Railroad Commission for some time to shut in the oil wells of Texas for eight days each month—four Saturdays and four Sundays. This order therefore means that Texas oil wells will be shut in only five days during April instead of eight. The commission believes that three extra days production during April will not flood the market.

"The commission has scheduled a hearing for April 19 at Austin to consider again the question of preventing physical waste in the production of oil and gas, and the commission can at that time consider the question of allowable production in Texas. Close scrutiny and watchfulness can prevent the occurrence of any preventable waste that might be occurring in the oil fields of Texas.

"Texas is restricting her production far below that being exercised in some other states, and it is hoped that we may be joined in this effort at keeping production within market demand. There should be more relationship between production and reserves within the respective oil producing states.

"There will be only one exception to this order. It will be in the Rodessa pool, which is subject to conditions of drainage, due to being a tri-state field, and wells there will be permitted to produce seven days per week. All other oil wells in the state will be held to a strict six-day per week producing period."

All Commissioners Sign

The order was signed by all three commissioners. Prior to the hearing, Commissioner Thompson only, had failed to declare his position concerning the shutdown program. However, it was well known that he favored expanding the Texas oil market, although he has made a sincere effort to keep production within demand not only in Texas but throughout the United States.

Privately, however, he pointed out that if any increase in allowable was to be made, April was the ideal month. Last year, he recalled, some 30,000,000 barrels of crude was withdrawn from storage, so that, if supply exceeds consumer demand, no additional storage need be constructed to hold the extra oil. If allowables prove to be too high, there is plenty of time during the remainder of the high consuming season to reduce allowables again and absorb the excess prior to September 1.

In addition to this situation, it is not unlikely that the commission had in mind protests against the curtailment program of the past year which has restricted production in Texas and enabled producers in other states to market a larger share of their oil in proportion to the reserve in place. This attitude was indicated by the prepared statement. Producers in Illinois and Louisiana, especially, may find it wise to restrict their intensive drilling campaigns and the high allowables assigned to some wells in order to prevent a price break which might follow.

The only hope of protection they would have would come from federal control, and there is no reason to believe that if such control were inaugurated that existing markets would be found divided among new fields or that

Texas Basic Allowables By Districts

	DISTRICT	Allowable January 1, 1939	Allowable April 1, 1939
1	Southwest Texas	39,647	41,197
2	Southwest Texas	70,972	76,618
3	Gulf Coast	271,735	285,200
4	Southwest Texas	207,028	219,087
5	East Central	30,116	30,301
6	East Central	88,345	91,136
	East Texas Field	522,453	522,603
7-B	West Central	52,832	36,922
7-C	West Central	29,517	30,389
8	West Texas	243,582	265,654
9	North Texas	94,184	117,654
10	Panhandle	85,103	88,996
	State Total	1,735,514	1,805,757*

* It is estimated the five Sunday shutdowns in April will result in an average allowable of 1,513,000 barrels.

high allowables such as those assigned to some wells in other states would be continued. To the minds of most observers, it appears most likely that there would be a freezing of markets for the time being. Where the restrictions would be made, that would forbid drilling campaigns such as those that have been conducted in Illinois and depend entirely upon conjecture.

In the accompanying table the comparative district allowables for January, when the last order became effective, and April 1, are shown. The shift of approximately 18,000 barrels from District 7B in West Central Texas to North Texas resulted from a change in the district line to include all the south half of Jack and Young counties in the North Texas District.

Bureau sees slight increase in April crude requirements

Foreseeing a heavier demand than for any month since last September, the Bureau of Mines on March 20 foresaw need for a daily average supply of crude oil in April of 3,434,000 barrels, 94,000 barrels more than forecast for March although almost 1 percent less than the actual domestic demand for April, 1938.

The bureau explained that a figure lower than output of a year ago was forecast in the face of the fact that estimated daily runs to stills are 81,500 barrels higher than during the earlier period, because it is anticipated that crude exports and fuel and losses next month will be considerably below those of last April.

"Daily average crude-oil production and runs to stills during the four weeks February 4 to March 4 were 3,331,000 and 3,169,000 barrels, respectively," the bureau explained in its report. "During this period, total crude-oil stocks increased 251,000 barrels, comprising a decline in foreign stocks of 238,000 barrels and an increase of 489,000 barrels in domestic stocks. The apparent daily average demand for February was 3,313,000 barrels compared with 3,220,000 barrels estimated by the bureau. The difference of nearly 100,000 barrels represents largely excess crude runs to stills, the high rate of which caused gasoline stocks to increase about 2,200,000 barrels more than the bureau estimated."

Motor-fuel demand for the coming month is estimated by the bureau as 46,300,000 barrels, or 7 percent over the demand for April of last year. Although a part of this expected increase can be attributed to a slightly subnormal demand a year ago, it was pointed out, the principal cause rests in improved business conditions, combined with the upward trend in motor-fuel demand per vehicle.

Lower Export Demand Forecast

Motor-fuel exports, on the basis of exporters' forecasts, are estimated at 4,300,000 barrels, 174,000 barrels less than the actual last April, and the bureau estimates also that gasoline stocks will be reduced by 2,800,000 barrels during the coming month, pointing out that stocks of finished and unfinished gasoline on January 31 were 79,466,000 barrels, and that stocks increased sharply in February, according to the American Petroleum Institute, possibly reaching a figure of 87,000,000 barrels as of the end of that month.

With benzol and direct sales and losses of natural gasoline estimated at 1,100,000 barrels, the bureau places refinery production in April at 46,700,000 barrels, which it distributes among the various districts as follows:

East Coast, 6,120,000 barrels; Appalachian, 1,670,000 barrels; Indiana-Illinois, 8,550,000 barrels; Oklahoma, 2,820,000 barrels; Kansas-Missouri, 2,270,000 barrels; Texas Inland, 3,320,000 barrels; Texas Gulf Coast, 12,200,000 barrels; Louisiana Gulf Coast, 1,420,000 barrels; North Louisiana-Arkansas, 920,000 barrels; Rocky Mountain, 1,220,000 barrels, and California, 6,190,000 barrels.

Natural gasoline consumption at refineries in April is estimated by the bureau as 6.3 percent of the total production, or 2,940,000 barrels, and the yield of straight-run and cracked gasoline is estimated as 44.6 percent, which, applied to the production of 43,760,000 barrels, gives needed crude runs of 98,120,000 barrels, or 3,270,700 barrels daily. Foreign crude runs are estimated as 2,200,000 barrels.

Exporters' forecasts on probable export demand, it was pointed out, are less optimistic with regard to crude oil and the estimate therefore has been reduced to 5,300,000 barrels, compared with actual shipments in April, 1938, of 7,553,000 barrels. The estimate for fuel and losses also has been reduced, to 1,800,000 barrels.

On the basis of these estimates, total demand for domestic crude for the coming month is placed at 103,020,000 barrels, or 3,434,000 barrels daily, has been allocated among the states, as shown in the accompanying table.

Independents criticize Texas allowable increase

Informal and scheduled talks during the meeting of the Independent Petroleum Association of America, in session in Houston, March 23, revealed on the part of most attendants amazement at and a complete lack of understanding of the logic behind reasoning of the Texas Railroad Commission in issuing a statement March 23 that the Saturday shutdown order in force for months would be lifted April 1, leaving only the Sunday shutdown in effect.

The meeting, one of the best attended yet held by the association in Houston, was presided over by Pat Rutherford, oil operator and drilling contractor. Featured addresses by H. M. Stalcup, Tulsa, vice president of Skelly Oil Company, and H. B. Fell, Simpson-Fell Oil Company, Ardmore, Oklahoma, a vice president of the association, went into the work of the special study committee of 36, headed by Wirt Franklin, and the current rather unsatisfactory predicament of the producer of crude oil.

Fell said that production east of the Rocky Mountains must be held down to 2,700,000 barrels per day for the next few months unless the oil industry wants to return to the unfavorable conditions that resulted in balance sheets for 1938 being generally less satisfactory than those for 1937.

He told of the association's current fight to establish a "Five Point" program involving: (1) limitation of imports of petroleum and its products to a fixed ratio to the estimated demand for consumption in the United States and for export, and the establishment of more equitable duties on imports; (2) establishment of some practical method through which domestic production would be held within the limits of national consumptive demand; (3) continuation of efforts to impress legislators that producers should not be objects of discriminating taxes; (4) efforts to end over development of fields and close well spacing; (5) establishment of provision in federal law whereby voluntary agreements could be entered into, subject to approval by a proper federal agency.

Anger Brings Radical Proposals

Stalcup said that when crude prices were cut last fall after the producers felt they had been trying to abide by state allowables and trying to "play ball," many operators were literally angered. This he offered as an explanation of several radical proposals before the Independent Petroleum Association of America shortly after the cut. Among the proposals were those calling for pipe line divorcement, complete elimination of imports, appointment of a federal allocator for state allowables, federal control of the refining industry, and disintegration of integrated companies.

The committee of 36 killed the pipe line divorcement proposal by a 30 to 0 vote, and the disintegration proposal by a vote of 28 to 2, Stalcup said, but warned

Bureau of Mines Estimate of Crude Required by U. S. Refineries, April, 1939

(As no changes in crude-oil stocks are involved in these estimates, they represent demand rather than production)

STATE	Forecast, April, 1939	Forecast, March, 1939	Actual Demand April, 1938
Texas	1,412,700	1,363,900	1,391,000
California	592,000	588,400	702,000
Oklahoma	473,300	473,200	527,000
Louisiana	262,000	259,700	266,000
Kansas	152,700	150,300	173,000
Illinois	149,300	125,500	34,000
New Mexico	115,300	109,700	85,000
Arkansas	53,300	50,000	54,000
Wyoming	50,000	53,600	61,000
Michigan	48,300	47,700	54,000
Pennsylvania	48,000	45,100	47,000
Kentucky	17,700	17,700	12,000
Montana	15,300	13,500	13,000
New York	15,100	14,800	14,000
Ohio	10,900	9,800	9,000
West Virginia	10,100	10,000	10,000
Colorado	5,000	4,200	4,000
Indiana	3,000	2,900	2,000
Total	3,434,000	3,340,000	3,458,000

that many who voted against these proposals said they would return to them if some other solution is not worked out. None of the committee seemed to relish federal control, and control of the refining industry the committee found impractical under existing laws.

Work of the committee resulted in appointment of two subcommittees now busy on projects involving, among other things, determination of why the code for fair marketing practices has been pigeonholed by the Federal Trade Commission; ascertaining the time required for and the cost of a study of the problems of the industry from the refiner to the consumer by a disinterested party; ascertaining the legality and feasibility of the proposal to have the Securities Exchange Commission make an annual financial statement showing earnings in each of the four branches of the industry, based on statements furnished by integrated companies; study of the problem of transportation of crude and refined products and the fairness of current transportation charges and costs.

Stalcup said that the association had made some remarkable progress toward stabilization of the industry since December, but closed with the remark that:

"Ninety-nine percent of the wind has been taken out of my sails by today's announcement of the increased Texas allowables for April. It puts us back to where we were two years ago."

Limitation of Imports

Referring to the import situation, Fell advocated imports should be held to within 4½ percent of demand and proposed that the independents work toward passage of a law to accomplish that. He said imports were 150,000 barrels less per day than when the association started its fight against them. He advocated re-enactment of the Connally Act and the passage of conservation laws by those producing states which do not have them.

Public control of the oil business was predicted by Fell if producers did not hold output down to a reasonable figure. This was said in connection with a condemnation of heavy drilling and close spacing. He closed with the wish:

"I hope we can some day gear the progress of our economic administration of the oil business to the progress that has been made in the technical end."

California curtailment back to Central Committee

California's oil curtailment program which has been under the direction, unofficially, of the Emergency Executive Committee of Independent Oil Operators, was virtually tossed back to the Central Committee of California Oil Producers following a vote on the 13 recommendations submitted to the industry by the Fact Finding Committee last week.

Ballot results revealed that 163 operators, representing 411,500 barrels daily production, voted. Of this number 126 operators, representing 64,300 barrels daily production, approved the report in principle; 24 operators, having a daily production of 222,600 barrels, approved the report in principle, but did not approve the formula (having to do with classes of wells, minimum wells, maximum wells, and intermediate wells). Thirteen operators with 124,500 barrels daily production did not approve of the report in principle.

Despite the fact that the barrelage-vote turned down the formula portion of the recommendations, the central committee, headed by Lawrence Vander Leck, chairman, moved that the report be turned over to the administrative and allocation committees for further study.

J. U. Stair, Shell Oil Company, at the special meeting of the Central Committee last week by motion called for a new election of field committees to represent producers in the various fields. Vander Leck appointed a committee of nine to make the necessary preparations for the election which will be pushed up two months. Generally the annual election is held in July but due to the efforts of voluntary oil curtailment and the asserted need for new work along that line the annual election will probably be held during April. On this committee will be: H. S. Stark, Ross McCollum, Emil Kluth, W. C. Whaley, William Keck, Jr., R. M. Sperry, W. H. Geis, Warner Clark and Joseph Jensen. At the same time Vander Leck announced that the regular monthly meeting of the Central Committee will be held April 8 to act upon recommendations of the allocation committee which sets the monthly allowable production for the state.

Oil at the Capitols

States protest efforts to give federal government ownership of offshore oil lands . . . California, Illinois and Kansas study proration legislation

Offshore ownership is studied at hearing

Representatives of some 60 port authorities, and of state and city governments gathered in Washington last week for hearings, first before the House Judiciary Committee and, beginning March 27, before the Senate Public Lands Committee, on the Nye-O'Connor and Hobbs resolutions asserting title of the federal government to the California off-shore oil lands.

Aside from officials of the Navy, Justice and Interior Departments, the legislation had little defense from witnesses appearing before the two committees, but was subjected to vigorous attack as an attempt to vitiate the sovereignty of the states over their contiguous water lands which, while now confined to California, admittedly would be the entering wedge for seizure by the federal government of the off-shore oil lands of the Gulf states and a threat to port and other developments of states along the Atlantic.

Appearing before the House committee March 22 to explain his resolution, which differs from the Nye-O'Connor resolutions in that it is confined to California whereas the others are general in nature. Representative Sam Hobbs of Alabama admitted his belief that government assertion of title should not be limited to California alone, although, he explained, that state is in the "weakest position" to defend its title to off-shore lands and court decisions which would be sought under the legislation would develop definitely the federal government's rights in the matter.

"I will not be a party to any Teapot Dome oil scandal," the Congressman declared in the course of his argument. "The value of the oil off California is estimated variously at from two to five billion dollars. It is where the Navy needs it.

"The vast bulk of the oil now being extracted is being sold to Japan, and Japan has as much right to buy as any other purchaser, but we need that oil."

The Alabama Representative denied charges that the legislation contemplates seizure of tidelands, asserting that its effect would be confined to the lands between low-water mark and the three-mile limit. He also denied that there was any intention to interfere with the port authorities' developments and that all "vested" rights were specifically exempted in his measure.

Further, he asserted, the legislation is not retroactive and there is no thought given to attempts to recover damages for oil already taken out in the California fields. "It would not be fair, even if technically legal," he explained, "to seek to recover damages for the oil already taken."

On the other hand, he said, the off-shore fields cannot be considered as public lands, thus explaining the refusal of the Interior Department to grant prospecting permits when approached by the interests which later, as a result of that refusal, agitated for the pending legislation.

"Those who have staked out claims on the theory of securing title are mistaken," he declared. "There is no such thing as title in these lands except as it be in the family of nations. If you declare them to be public lands, then you do validate these claims of private interests who seek to extract this oil."

While, by the nature of its admission to the union, California has the weakest claim to the off-shore lands of any of the states, Hobbs said, Texas, next to the 13 original states, probably is in the strongest position. At the same time, he contended, in the exercise of its constitutional powers, the federal government may take and remove the soil under its territorial waters and, since the soil it-

self can be taken, "certainly one of the minerals found therein—petroleum—may be conserved for national need in the fulfillment of its constitutional duties, and taken when needed."

Only Want Valuable Areas

Under questioning by members of the committee, he admitted that the legislation is confined to California because that is the only state in which extensive underwater development is now going on, and that should a similar situation arise in Texas or some other state the same principle now sought to be adopted could be applied.

"Congress has taken no action to conserve the petroleum products in the submerged lands off the coast of California in the interest of commerce, national defense or maintenance of the Navy," he said. "Until such a right is asserted by Congress there seems to be no way to stop the exploitation and depletion of the petroleum deposits.

"The departments of the Navy, the Interior and Justice are one in requesting that this resolution be passed, so that the courts may determine the questions involved while fully protecting by their decrees all lawfully vested rights. There seems to be no good reason to deny their reasonable request that they be thus permitted to have the courts decide whether or not the nation has a paramount right to conserve, take and use the oil in question in the performance of the duties enjoined by the Constitution, for the benefit of all the people."

Efforts of the Navy Department to secure possession of the California fields are actuated solely by a desire to provide an adequate oil reserve on the West Coast, it was disclosed by testimony of Captain H. A. Stuart, U. U. N., Director of Naval Petroleum Reserves.

"The government can, of course, put its trust in the industry to supply the requirements for national defense in time of war as well as in time of peace," Captain Stuart said. "But no one knows when the industry may be unable to discover and develop reservoirs of crude petroleum as fast as it depletes them. Moreover, the industry is at all times not only producing and manufacturing petroleum products for domestic consumption, but also exports to foreign countries more than it imports. It would therefore seem to be an unwise policy to place entire dependence for the conservation of petroleum for national defense on the industry alone."

The most serious aspect of the problem of reserves, however, he indicated, lies in the fact that more than 87 percent of the known industrial reserves lies east of the Rocky Mountains and less than 13 percent are on the Pacific Coast, all in a comparatively small area in southern California.

"Any prolonged conflict in the Pacific area would soon draw heavily on the California oil supply and it is extremely doubtful if the demands for naval and military needs in addition to industrial requirements could be met adequately over a period of years," he said. There are no pipe lines from the Mid-Continent fields to the coast. To depend on shipments through the Panama Canal would be "trusting much to chance," and no satisfactory substitute fuels are available on the coast, he pointed out.

"The only solution for increasing the governmental reserves and for effectively conserving petroleum for the national defense where it is most needed therefore, lies in the acquisition of additional petroleum lands by the government. Such lands are available on the Pacific Coast where anywhere from 300,000,000 to 1,000,000,000 barrels of oil are estimated to lie in the submerged lands off the coast of southern California. Ownership of these deposits has never been established. The state of California has assumed possession and has permitted operators to drill wells into these rich deposits and to extract oil already in excess of 100,000,000 barrels while wells adjacent to these submerged lands have drained from them at least 25,000,000 barrels of oil."

Certain companies, while advocating curtailment of production as a conservation move, he told the committee, are at the same time engaged in drilling on these lands.

"The federal government has no desire to obtain property belonging rightfully to others," he said, "but it feels that where ownership has not been determined and especially where the necessity for enhancing its petroleum reserves is so urgent and important that it is its duty to protect the public interests and the national welfare.

"The state of California will benefit ultimately as much, if not more, than anyone else by enlargement and preservation of the naval petroleum reserves for the national defense, and could wisely afford to support rather than to hinder this undertaking."

Captain Stuart explained that, assuming the oil from Naval Petroleum Reserves Nos. 1 and 3, "the only true reserves we now have," will be efficiently utilized when produced and that all of the more valuable products will be extracted by refining before the residue is available as fuel for ships, it is probable that the reserves actually represent a backlog of less than 20 years' peace supply for the Navy, which is not believed to be an adequate fuel reserve.

"In certain of the areas affected by this proposed legislation great confussion over land titles has resulted in the loss of huge sums to the nation, state or municipality, whoever may eventually be determined to be the owner of these deposits," he declared. "Private interests have taken advantage of this situation and it is of very great importance that this question be decided as soon as possible.

"Your committee will probably be told that this oil cannot be protected from drainage; perhaps some of it cannot, but the argument is beside the point. If the oil belongs to the federal government this problem is one for the government to solve. The same defeatest argument was used as an excuse in the Elk Hills and Teapot Dome cases and I am sure that we do not wish a repetition of that scandal.

"Other more or less plausible arguments, chiefly of a legal nature, may be advanced against this proposition, but I repeat that we do not covet the property of anyone, whether state, municipality, corporation or individual, but we do believe that the government should assert its rights and leave to the courts to decide the issue of ownership. It is needless to say that we represent only the government, and have no commitments to anyone. If anyone has any superior right, title or interest in the premises he is fully protected under the terms of the proposed bill."

The Navy's position also was set forth in a letter from Acting Secretary Charles Edison to Speaker of the House Bankhead, in which it was charged that the production of petroleum in California is excessive, relative to the source of supply, and "the industry has expanded its markets without regard to reasonable conservation."

During the past nine years, Edison declared, the state's reserves have been depleted by nearly 20 percent, due primarily to withdrawals in excess of actual normal needs, whereas reserves outside of California have shown a pronounced increase.

Asserting that if the government has any right to the off-shore lands, it is not necessary to state a policy, as is done in the resolutions under consideration, Senator Tom Connally of Texas told the committee it was necessary only to instruct the Attorney General to assert title if the sole desire is to secure court interpretation. The statement of policy, he charged, was in effect notice to the courts as to how Congress expected them to rule.

At the same time, he said, the limitation of the legislation to California is meaningless, since "if the government owns deposits in California it owns them in Texas and does not need any assertion of title for the Attorney General to go into the courts and secure an adjudication."

So far as Texas is concerned, he declared, it reserved all its rights and lands when it entered the Union, and "we do not regard it quite fair to the state of Texas to have the threat hanging over our heads constantly as it will be from the assertion of this resolution that the federal government at some future time would make some direct attack upon the right of the state to these submerged lands and the oil deposits thereunder."

Legal Phases Aired

All of the further testimony of witnesses appearing before the committee was devoted almost entirely to a discussion of the legal phases of the situation and argument as to the right of the federal government to the off-shore lands.

Title to more than 3,000,000 acres of submerged lands along the Texas coast from Sabine Pass to the mouth of the Rio Grande, with high potential value in oil, would be clouded if Congress adopted any of the measures before it, the committee was told by Assistant Attorney General of Texas R. W. Fairchild.

Denving a statement by Representative Hobbs that there was little development of submerged lands outside of California, Texas representatives declared there are 50 producing wells tapping the underwater resources off the coasts of Jefferson, Chambers, Galveston and Nueces counties, and that development of Brazoria and Matagorda counties will be undertaken in the near future.

While the fight against the legislation is being most vigorously waged by California, all of the coastal states have pooled their issues and are making an organized defense against the government departments, their major argument being that the passage of the legislation will serve to cloud thousands of land titles, even in states where the government has no intention of attempting to secure any territory.

California officials and representa-

tives from other coastal states attacked the policy of the Hobbs resolution at the final hearings March 23, declaring that if the Department of Justice had the authority to sue to determine ownership of the lands there was no need for Congress to enounce any declaration of policy.

Numerous Supreme Court decisions holding that the coast stations own the adjacent submerged lands were cited by the state officials, who contended that ownership of the lands extended to any minerals thereunder. At the same time, seizing upon Representative Hobbs' declaration that the off-shore lands could not be classified as public lands, they declared that when California entered the Union and ceded its public lands to the federal government it did not thereby relinquish any claim to any under-water territory, but that the only right it gave therein was that to use such territory for navigation.

Apparently anticipating that the question of ownership of the off-shore lands would come up again this year, the State of Louisiana since the last hearings has extended its claim from three to 27 miles. Louisiana officials explained that they secured from a reserve corps officer "expert advice" that present effective cannon range is 27 miles (the "three-mile limit" originally was the distance of a cannon shot from shore), and the state legislature passed an act extending its territorial limits accordingly. Similar legislation is pending in Texas, it was said.

California and other officials refused to accept the assurance of Representative Hobbs that the proposed action would not affect present rights, asserting that if the government established its claim to the lands there would be nothing to prevent it from acting against those who have taken out oil and demanding damages.

Illinois may study oil problem

The Illinois House of Representatives last week approved a joint resolution calling for an investigation of "oil production, processing, transportation and marketing" within the state. The measure, which calls for a ten-member body evenly divided between House and Senate members, was sent to the Senate for concurrence.

The committee would have the power of subpoena, both of witnesses and records, and would be required to report back to the legislature with recommendations for laws to control the industry not later than April 30.

"A thorough investigation of the subject is necessary in this state," the resolution reads. "Hasty legislation without proper consideration may very likely result in inestimable damage in this vast industry."

Urging creation of the committee, majority leader R. J. Branson, of Centralia, told the house that "we have proration of oil and we don't know it."

"In pipe lines down in the oil fields where the capacity is from 800 to 1000 barrels a day, they are only taking fifty," he said. "An investigation could call these people and ask them why they are not taking our oil."

Opposition to the resolution was expressed by Representative Sidney Parker, of Texico, who maintained that both branches of the legislature have adequate committees to make a study of oil legislation. He referred to new standing committees to deal with oil measures that were created for the first time when the legislature convened in January.

A measure which would have required an operator who failed to find oil or gas within 60 days after start of operations at a well site to abandon the project received an unfavorable committee report last week.

Among new measures introduced were bills to require pipe line operators to furnish bonds to secure payment of the proceeds of oil and gas sales to persons entitled to such payment, to impose a tax upon all oil transported into the state at the rate of two cents a gallon, and to permit issuance of mechanics' liens in connection with oil drilling.

Permanent hot oil act approved by Senate

Approving Senator Connally's bill to make his "hot" oil act permanent legislation, the Senate on March 23 sent the measure to the House of Representatives where, as happened two years ago, its extension is expected to be limited to two years.

The measure, taken up in the course of formal consideration of the Senate calendar, was passed without any debate whatever, due largely to the fact that majority leader Barkley and other members had induced Senator King of Utah to refrain from making an effort he planned to limit the extension to a two-year period.

Oil state members of the Senate this week were not particularly optimistic over the chances of the bill passing the House without an amendment limiting its life, pointing out that the Senate two years ago provided for permanent application of the act only to be overridden by the lower body.

California oil law urged upon legislature

Passage of an oil control bill establishing a conservation commission with power to force proration of oil production in California was urged by spokesmen for the United States Navy and others at Sacramento last week. Commander W. B. Greenwood set forth the Navy's views on oil production situation here and declared the Navy's approval of the bill, with suggested amendments. George W. Holland, director of petroleum conservation for the Department of the Interior, did not appear for or against the bill but looked on it as a conservation measure.

Harvey C. Fremming, president of the Workers International Union, favors the Bill and said that regulation of production will mean stabilization of the oil workers employment problems.

The bill proposes establishment of an oil conservation commission which would be given jurisdiction over all matters relating to the conservation of oil and gas, and for setting up rules and regulations pertaining thereto.

It was pointed out that there is an overproduction of oil in California amounting to 28,000 barrels per day; that there are about 164,000,000 barrels or nine months production in storage with remaining available storage totaling to only 5,000,000 barrels. What will happen when storage is completely used up, is the question continuously asked.

Oil monopoly study delayed by committee

Monopoly conditions in the oil industry probably will not be taken up by the temporary National Economic Committee for six weeks or two months, it was learned in Washington this week.

While, due to the recent death of the father of Leon Henderson, secretary of the committee, and the pressure of other business upon Senator O'Mahoney, chairman, no plans for future activities have been made. It was disclosed that oil will not be the next subject taken up for investigation and may not be reached before some time in May.

Another deterrent to the development of future plans has been the uncertainty as to funds. The committee has asked congress to authorize an additional appropriation of $2,000,000, of which $600,000 is to be made immediately available, but no action has yet been taken.

While the committee is confident it will be given the appropriation asked for, it is running short of money at the present time and will be forced to furlough its staff within a few weeks unless congress acts in the meantime. Officials of the committee, accordingly, have temporarily suspended most of its activities, although the federal agencies, it is said, are sufficiently well financed to continue the investigations they are making as a basis for future hearings.

Texas tax problem reaches stalemate

The Texas Legislature appeared last week to have reached a stalemate on the pension-tax problem. The house argued the proposed constitutional amendment for several days and then could not obtain the vote necessary to pass it. Since the measure would be submitted to the people as an amendment to the constitution, 100 votes in the house and 21 votes in the senate must be obtained for this submission.

The plan finally voted on was a combination sales tax and natural resource tax, which would have raised the rate on oil approximately one cent per barrel.

Meanwhile the house had passed a resolution to require the committee on revenue and taxation to bring out some of the bills in that committee, but instead the committee met and killed the three bills voted on. Efforts to bring them out anyway failed when the house declined to vote this procedure.

Meanwhile the senate had discussed the sales tax bill which had received the endorsement of Governor Lee O'Daniel in a radio address from the mansion on Sunday, March 19. This brought forth an attack on the governor for abandoning his campaign

[*See Capitols, page 83*]

Geological Meetings

Current economic trends are studied along with a great many technical papers at annual convention of geologists, paleontologists and geophysicists

Current trends in the petroleum industry were reflected in the program of the twenty-fourth annual meeting of the American Association of Petroleum Geologists March 22, 23 and 24. In the consideration of economics, two papers, one presented and one read by title, were devoted to proration and its influence on development. The growing status of southern Illinois and the leasing play in the Forest City Basin were responsible for these areas drawing program attention.

Record Attendance

The meeting marked a high point in attendance as well as association membership. Registrations for this meeting passed 2000. The membership March 1 stood at 2951 with sufficient applications on file to assure its passing 3000 this year. Membership growth was mentioned by Dr. Donald C. Barton, retiring president, who said it was now so high that some cities within oil producing territory could not provide facilities for the annual meetings. He suggested that consideration be given to solution of this problem, either by enlarging the mid-year meeting, placing further restrictions on membership requirements or confining meetings to the few cities equipped to afford facilities.

Texas stands first in membership with 988. Most marked growth last year was in Illinois, Indiana and Kentucky. The Illinois Geological Society has made application for affiliation.

Both the Society of Exploration Geophysicists and the Society of Economic Paleontologists and Mineralogists held their annual meetings simultaneously.

Routine business brought changes in both by-laws and the association constitution relative to committee appointments.

The session Thursday afternoon covered the following areas on the basis of field development: West Texas and New Mexico, H. P. Bybee and Berte R. Haigh, University Lands, University of Texas; South Texas, Gentry Kidd, Stanolind Oil & Gas Company, San Antonio; North-Central Texas, J. J. Maucini, Continental Oil Company, Wichita Falls; Gulf Coast and Southeast Texas, O. L. Brace, consulting geologist, Houston; North Louisiana and Southern Arkansas, W. C. Spooner, consulting geologist, Shreveport; Oklahoma, E. F. Shea, Stanolind Oil & Gas Company, Tulsa; Kansas, Rycroft G. Moss, Phillips Petroleum Company, Wichita; Illinois, Alfred H. Bell and George V. Cohee, Illinois State Geological Survey, Urbana; California, Harold W. Hoots, Richfield Oil Corporation, Los Angeles; Rocky Mountain area, J. M. Kirby and H. N. Hickey, the California Company, Denver; foreign, Basil Zavoico, Chase National Bank, Houston, and Frederick G. Clapp, consulting geologist, New York.

Papers on the technical program, besides those presented at one general session and another on economics and recent developments, were grouped according to four geologic provinces; namely, the Permian Basin, Mid-Continent - Pennsylvanian; Mississippi Embayment, and the Eastern Interior Basin. Abstracts of the majority of the papers, except those on recent field developments, are presented in the following discussion:

Economic Papers

Wildcat Drilling Trends

By FREDERICK H. LAHEE
Sun Oil Company

Both the number of wildcat wells drilled and the number of oil discoveries from wildcat drilling have increased in the four years through 1938.

During 1935, the drilling of 1065 wildcat holes resulted in 78 producing wells, a percentage of 7.32.

In 1936, 1087 wildcat tests were drilled, of which 116 or 10.67 percent proved productive.

The 1140 wildcats drilled during 1937 resulted in 138 producing wells, a percentage of 12.1.

The year 1938 saw 1178 wildcat tests drilled, and 142 of these proved productive, or 12 percent.

More than 14 percent of the wildcats drilled on scientific recommendations were successful, while less than 5 percent of those drilled without scientific recommendation have been successful in the last four years.

Gayle Scott Elected President of Paleontologists

Officials of the Society of Economic Paleontologists and Mineralogists, elected at the annual meeting in Oklahoma City, March 24, are: Gayle Scott, Texas Christian University, Fort Worth, president; Herschel L. Driver, Standard Oil Company of California, Los Angeles, vice president; H. B. Stenzel, Bureau of Economic Geology, University of Texas, Austin, secretary-treasurer.

Relation Between Crude Oil and Product Prices

By SIDNEY SWENSRUD,
Assistant to the president, Standard Oil Company of Ohio, Cleveland.

It seems probable that the downward price changes in the last year, first of products and then of crude, signify smething more than the mere need of further regulation: they probably indicate that too much capital has flowed into the business recently, relative to the work to be done to meet the demand requirements. The immediate causes of the price reductions that have occurred probably are of less importance, therefore, than the fundamental one of repelling the flow of capital. So far as refining is concerned, there would seem to be nothing abnormal in the fact that the margin for refining declines from time to time when demand relative to supply diminishes. On the other hand, there appears to be an undue postponement in the response of crude oil prices to the same forces that cause downward movements in refined product prices. This situation has quite clearly operated to the disadvantage of the refining branch of the industry a large part of the time since the advent of proration.

Importance of Capillary Phenomena in Oil Production

By F. B. PLUMMER and
H. K. LIVINGSTON,
Bureau of Economic Geology, University of Texas, Austin.

The significance of surface and interfacial tensions in reservoir studies were discussed, and the importance of dis-

covering methods to deal with these factors in order to increase the flow of oil through fine-grained rocks was pointed out. The possible applications of chemical treatment to reduce the flow of water into wells producing both oil and water from fine-grained sands were outlined. A new experimental apparatus for studying radial flow of mixtures of oil and water was described, and tentative results of laboratory experiments with detergent chemicals introduced into the oil sands to reduce the flow of water were given. It was thought that the experiments have special significance in reservoirs where salt-water injection was being tried or contemplated.

The Basis of Proration in Texas

By WALLACE E. PRATT,
Director, Standard Oil Company of New Jersey, New York.

The institution of proration is vital to the welfare of the oil-producing industry in the United States; yet its essential function is so widely and so commonly misinterpreted that its utility and even its continued existence are gravely menaced. Petroleum geologists are particularly concerned with the success of true proration and should not fail to understand its fundamental character.

The popular belief among oil producers makes of proration a form of curtailment designed to prevent overproduction of crude oil and thereby to secure and maintain higher prices and an assured market outlet for every producer. In contrast to this generally held concept, proration in Texas, where (despite the fact that it had its inception in Oklahoma) it has evolved farthest and has been applied most widely and drastically, rests solely on (1) the conservation laws for the prevention of physical waste of oil and gas, (2) the police powers of the state for the protection of the citizen in his basic property rights. Any curtailment of production by agreement (except curtailment of agricultural production) is specifically prohibited by the anti-trust laws of the state.

Valid proration in Texas, then, merely prevents physical waste. It does not supersede nor set aside the "law of capture." On the contrary, it functions fully within the operation of the law of capture. Nerevtheless, it ameliorates effectively the excesses and inequities that have arisen out of the application of the law of capture in the past. Even the provision for "limitation to market demand," frequently denounced by economists as an unsound and meretricious "production control," is in fact fully justified (and justified only) as a means of preventing physical waste. Likewise, the prevention of physical waste as a function of oil-production engineering takes on a significance not generally recognized. In the absence of proration the prevention of physical waste becomes impossible.

If the industry persists in its attitude that proration is a device to be used by the individual states or by the Interstate Compact to curtail the production of oil for the purpose of "stabilizing the industry" or "improving the price level," it will jeopardize the life of a concept which in preventing physical waste can render great service to oil producers.

Henry A. Ley Elected President of Geologists

Henry A. Ley, vice president, Southern Cross Oil Company, San Antonio, was elected president of the American Association of Petroleum Geologists at the annual convention of the association last week.

Other new officers are: L. Murray Neuman, Carter Oil Company, Tulsa, vice president; Ed W. Owen, with L. H. Wentz, San Antonio, secretary-treasurer; and Walter A. Ver Wiebe, University of Wichita, Wichita, Kansas, re-elected editor.

Ley graduated from the University of Pittsburgh in 1917, and first worked for Southwest Gas Company at Independence, Kansas, then Sun Oil Company in Texas. He then had foreign service with Standard Oil Company (New York) in Palestine and Syria after which he returned to Sun Oil Company and then to Southwest Gas Company. He was made chief geologist of Sun Oil Company in Tulsa in 1924, from which concern he resigned to do consulting work. Later he was geologist for Rio Bravo Oil Company, and now is vice president of Southern Cross Oil Company, with headquarters at San Antonio.

General Session Papers

Correlation of Crude Oils With Special Reference to Gulf Coast Crude Oils

By DONALD C. BARTON,
Research Geologist, Humble Oil & Refining Company, and president of American Association of Petroleum Geologists.

The pattern of the graph of the derivation-from-the-mean of the difference between the A.P.I. gravity of adjacent cuts in the U. S. Bureau of Mines Hempel analyses of crude oil is reasonably characteristic of the crude oil of individual reservoirs and is reasonably invariant in the face of drastic artificial oxidation and weathering. Wide variation is shown by the various crude oils of Texas, Louisiana, Arkansas, and Oklahoma. In many cases, the patterns for the crude oils or part of the crude oils from approximately the same or approximately equivalent formations will show mutual similarity which is very much closer than their resemblance to the patterns of other crude oils. Drastic difference is present in a few cases between patterns of crude oils from the same sand (examples: Woodbine, "Wilcox sand" of Oklahoma). The presumption seems justified that in general, but not universally, very close similarity in pattern indicates genetic relationship for the corresponding crude oils. The presumption is yet stronger that drastic difference in pattern necessarily indicates difference in origin or history for the crude oils in question. These patterns offer a usably good but not perfect means of studying the genetic relationships and non-relationships of crude oils.

These conclusions are based on a rapid reconnaissance of the patterns for the Pennsylvanian and Permian crude oils of Texas, of the Oklahoma crude oils, and of the Cretaceous crude oils of Texas, Louisiana, and Arkansas, a few special detailed studies, and a detailed study of the patterns of Gulf Coast crudes.

The following theoretical conclusions seem to follow from the similarities and non-similarities of pattern and from the stratigraphic and areal occurrence of the Gulf Coast crude oils. The most common Plio-Miocene and younger Miocene crude oils cannot be migrant older oils. The older Miocene (post-Discorbis zone) crude oils and a group of "Oligocene" (post-Vicksburg) crude oils cannot be migrant oils of the most common Eocene and "Oligocene" types. Most of the source beds are decidedly limited in occurrence; and part of the variation in prolificness of adjacent structures is the effect of lensing in and out of the source beds. In spite of evidence against vertical migration at either place, some common factor producing similarity of pattern has affected crude oils through most of the Miocene section at Lockport, La.; and a similar factor has affected crude oils through all but the uppermost part of the Miocene section at Spindletop, Texas. Part of the similarity in pattern between crude oils of adjacent ages is the effect of persistence of similarity of source conditions over a period of time. This pattern holds reasonably invariant in face of variation of the base from naphthenic to paraffinic. This more detailed study of the Gulf Coast crude oils through their A.P.I. gravity patterns really is only an extremely rapid reconnaissance into a new field and it indicates great promise for further research.

Some Vertebrate Fossils of the Texas Gulf Coastal Plain

By E. H. SELLARDS,
Director, Bureau of Economic Geology, University of Texas, and President of Society of Economic Paleontologists and Mineralogists.

As the Cenozoic formations of the Gulf Coastal Plain of Texas of Oligo-

E. A. Eckhart Heads Geophysicists Society

Officials elected at the annual meeting of the Society of Exploration Geophysicists, held March 21-23, at Oklahoma City, were:

E. A. Eckhart, Gulf Oil Corporation, Houston, president.

W. T. Born, Geophysical Research Corporation, Tulsa, reelected vice president.

J. H. Crowell, Independent Exploration Company, Houston, secretary-treasurer.

R. D. Wycoff, Gulf Oil Corporation, Houston, editor.

cene and later age are non-marine at their outcrop, they present difficulties in age determination. Several of these formations contain vertebrate fossils which give promise of supplying data on correlation. Collections of vertebrates are being made at the present time from the Pleistocene and Pliocene formations and will be made later from the Miocene and Oligocene. A locality yielding particularly good vertebrate fossils has been found in the Goliad formation in Bee County. The stream terrace deposits of the Coastal Plain contain an abundant Pleistocene vertebrate fauna. Vertebrate fossils by reason of the relatively short range of species are valuable for correlation purposes.

The Relationship of Geophysics to Geology

By F. M. KANNESTINE,
Independent Exploration Company, Houston, and president of Society of Exploration Geophysicists.

This paper defines geology and geophysics as applied to the oil industry, showing their related function in their past and present attempt to define the attitude of sedimentary beds. It is indicated that sedimentary basins in general are as closely and as highly faulted as the positive areas surrounding them. The detailed structure of many of these basins, however, is obscured by alluvium, glacial drift, continental deposits, or sedimentary beds of younger age than those from which production may be found. Since these areas enormously exceed those in which we have detailed information, there still remains a vast amount of exploration to be done. This creates a challenge for the improvement of methods and technique of structural mapping.

Origin of Black Shales

By W. H. TWENHOFEL,
University of Wisconsin.

Explanations of origin are reviewed and environments in which black muds are in process of deposition are considered. The causes of blackness are examined and attention is given to diagenetic processes that take place in black muds.

It is concluded that colors of black muds are due to several components, of which some are developed in diagenesis and others are due to inclusion of organic matter of various kinds. Sediments that are black at the time of deposition may have the constituents to which blackness is due eliminated during diagenesis, or following lithification. These produce rocks that are not black. It is concluded that black muds develop under several environmental conditions, of which some are found in land waters, some in shallow marine waters, and probably some in deep marine waters, and that retention of blackness is dependent upon the extent of micro-organic processes in the muds.

Rocky Mountain Geology

By JOHN G. BARTRAM,
Division geologist, Stanolind Oil & Gas Co., Tulsa, Okla.

The Rocky Mountain area of the western United States presents the most complete record on this continent of geologic events from Archean time to the present. Sediments from all the major periods are known somewhere in the region and excellent outcrops have made possible their detailed examination. Many geologists have worked up there and the literature is vast.

This paper is an attempt to summarize it all and to present a continuous story of geologic conditions and happenings in the Rocky Mountains from the pre-Cambrian to Recent. This was done with a series of paleographic maps and cross sections, and the stratigraphy described more than the structure. Four major events controlled the geology of the Rocky Mountain area.

1. The formation, in Algonkian time, of the Cordilleran geosyncline which extended from Utah to British Columbia and persisted in that position through all geologic periods to the end of the Upper Cretaceous.

2. The extension in the Pennsylvanian and Permian of the Arbuckle-Wichita-Amarillo line of mountains into New Mexico, Colorado, Utah, and Wyoming and their subsequent erosion and burial under Triassic and Jurassic sediments.

3. The uplift, in the Middle Triassic, of the Cordilleran landmass on the west and southwest which furnished sediments from that direction throughout the remainder of Triassic and all of Jurassic and Cretaceous time.

4. The extension eastward, at the close of the Upper Cretaceous, of the uplifted, folded, and faulted Cordilleran highland until the present Rocky Mountains were formed in the geosynclinal area and the sea was finally pushed from the interior of North America.

Tectonic Developments Off the California Coast

By FRANCIS P. SHEPARD,
Associate professor, University of Illinois, and research associate, Scripps Institution of Oceanography, La Jolla, Calif.

A basis for contour maps of the tectonic provinces which border the California coast was laid by the half million soundings taken in recent years by the United States Coast and Geodetic Survey. Investigations during the past year have greatly assisted the interpretation of the tectonic significance of these contours. The nature and possible times of fault movements in the Basin and Range province off southern California were discussed. Also the structural implications in the complicated topography off the Monterey Bay area were considered and the significance of a large fault scarp extending seaward off Cape Mendocino was given attention.

The Role of Isostasy in Mountain Building

By MALVIN G. HOFFMAN,
Chief geologist, Midco Oil Corporation, Tulsa.

Mountains are folded up by lateral compression but at the same time folded down several times as much as they are folded up. The downfolding is necessary to maintain a state of isostatic balance. Subsequent erosion of the mountain system is accompanied by periodic vertical uplifts. To reduce the area one mile it is necessary to remove 6 or 7 miles of rock.

This region may again become the site of deposition after base level has been reached. It is underlain by a segment which has experienced an increase in mean density and will be downwarped by lateral compression during a later stage of crustal collapse. Gradual sinking also may be produced by lowering of the isogeotherms which were raised during the period of erosion.

On the other hand, the area may continue its upward trend as a result of the formation of a magma underlying the mountain system. Removal of 6 or more miles of rock accompanied by a rise of the isogeotherms may be sufficient to initiate crystallization in the subcrustal tachylyte layer. Magnetic differentiation by fractional crystallization will produce a granitic liquid which has a relatively low density. The earth segment containing the magma will become a zone of very low resistance and be readily submissive to all stresses. Crustal elevations will be developed by stresses due to both isostatic adjustments and earth contraction. The magma will work its way upward by selective fusion, and vertical uplift brought about by isostatic adjustment to compensate for the removal of the overlying elevated portions of the crust.

Final solidification of the magma will convert this earth segment from one of erosion to one of deposition. Shrinkage will be caused by change from liquid to the solid state and the return to normal of the isogeotherms.

Drilling Time Data in Rotary Drilling

By T. C. HIESTAND,
Consulting Geologist, Indain Territory Illuminating Oil Co., Bartlesville
and P. B. NICHOLS,
Geological Engineer, Indian Territory Illuminating Oil Company, Seminole.

Evidence of the acceptance by geologists, engineers, and drillers on the Gulf Coast, in the Mid-Continent, and in the Interior Coal basin, of the importance of complete foot-by-foot drilling-time records, has been shown in recent literature and discussions. This importance is pronounced due to the modern rig where rotary practice inclures features of controlled weight on the bit, regulated rotary speed, maintained pressure, velocity, and consistency of the mud, as well as leak-proof tool joints and rock bits designed and treated to penetrate each given formation efficiently. Accurate measurements are made from the cellar to the total depth. Since blow-outs are less frequent the geologist must be able to determine positions of all producing zones drilled with improved technique at the well, whereas formerly discovery of "stray" producing formations often resulted coincidental with the blow-outs.

Under proper conditions foot-by-foot drilling time is inversely proportional to the porosity of the formations penetrated. Fluids and gas are encountered in porous beds, and almost without exception where the drilling rate is abnormally high. The time record of each foot is needed in order to cease drilling and circulate samples from the uppermost few feet of a reservoir bed and to determine presence of oil or gas before any water is encountered. Coring or running drill-stem tester may then proceed advantageously. During coring the foot-by-foot time is needed; and in case several feet of dense formation is cored before soft beds are encountered the barrel is removed and emptied in order to get full recovery of underlying porous formation.

The data are correlated with changes in formation revealed by the cuttings

to determine the relative sharpness or dullness of the bit in use. This interpretation insures a minimum time consumed by running on a dull bit.

Sample lag from bottom of the hole to the surface is readily determined from this data, thus correcting tops and bottoms of all beds. This will confirm electrical logging, geothermal data, and and other well surveys.

The present method of recording drilling time is by means of an observer who notes the time and depth at given intervals. Usual procedure is to mark the "Kelly" into equi-spaced segments varying from 1 to 5 feet depending upon the degree of control required. As these marks reach the rotary table, depth and time are recorded. The observer may be the geologist or engineer in charge. Some companies are requiring the contractors to furnish this information, in which case it is taken by one of the floor-men under the supervision of the driller. Accuracy of this method is entirely dependent on the human element.

A recent innovation in the method of obtaining the drilling time is by means of an instrument, which automatically records the speed of drilling on a time chart along with such pertinent information as round trips, circulating time, shut-down time, etc.

In operation a flexible wire line is made fast to the rotary swivel, taken over a sheave about 50 feet above the derrick floor, down through the instrument and up again into the derrick where it passes over a second pulley and is kept taut by a weight suspended in a guide of tubing. As this line feeds through the machine in the various drilling operations the amount and direction of motion is transferred to the time chart. This machine was conceived by P. B. Nichols and developed in cooperation with Indian Territory Illuminating Oil Company.

As only three of these machines have been manufactured to date it is yet too early to predict their entire field of utility.

Permian Symposium

The Permian in Parts of the Rocky Mountain and Colorado Plateau

By ARTHUR A. BAKER and JAMES STEEL WILLIAMS, Geologists with U. S. Geological Survey.

A very thick Permian section in the Wasatch Mauntains east of Provo, Utah, has been disclosed by field work of the Geological Survey in 1937 and 1938. This section appears to have special significance, for it offers promise of providing a key to the correlation of the Permian sequence of the southern Rocky Mountains and the Colorado Plateau with that of the northern Rocky Mountain region. The correlations here suggested represent only tentative opinions and may be modified after the fossil collections from this area have been completely studied.

The Permian of southwestern Colorado and southeastern Utah consists of the Cutler formation (red-beds) above, and the Rico formation (red-beds and limestone), below, which overlies the Pennsylvanian Hermosa formation. In going westward across southeastern Utah and northeastern Arizona, it is found that thick light-colored sandstone tongues appear in the red-beds of the Cutler formation. Still farther west at the Grand Canyon in Arizona the Permian rests upon the Mississipian Redwall limestone and consists in ascending order of the Supai and Hermit formations (red-beds) overlain by the Coconino sandstone (light-colored, cross-bedded) with the marine Kaibab limestone at the top. The Supai, Hermit, Coconino, and at least part of the Kaibab are believed to be continuous with and essentially equivalent to the Cutler formation. The Permian sequence is unconformably overlain by Triassic beds — Moenkopi formation in southeastern Utah and northeastern Arizona and Dolores formation in southwestern Colorado.

The Permian deposits of western Wyoming, Idaho, northern Utah, and eastern Nevada have generally been designated the Phosphoria formation, but in northwestern Wyoming they are included in the Embar formation by many geologists; in northeastern Utah they are included in the Park City formation; and some Permian strata in parts of Wyoming have been included in the Chugwater formation.

In its typical region in southeastern Idaho, the Phosphoria consists of an upper chert and limestone—the Rex chert member—and a lower phosphatic shale member, between the Woodside shale of Lower Triassic age and the Wells formation of Pennsylvanian age. At the top of the Wells formation is a limestone generally thought to be of Pennsylvanian age. Where the Park City formation is recognized this limestone (or beds considered to be equivalent to it) is its basal member and is overlain by the phosphatic shales and upper cherty limestone that has been assigned to the Phosphoria formation farther north. The Park City formation has accordingly been considered by most geologists as in part of Pennsylvanian and in part of Permian age.

In the vicinity of Provo, Utah, a series of rocks with a maximum thickness of more than 4000 feet is tentatively included in the Permian; it rests with probable unconformity upon a tremendously thick Pennsylvanian section and is unconformably overlain by the Lower Triassic Woodside shale.

Permian Red-Beds of Kansas

By GEORGE H. NORTON, Geologist, Atlantic Refining Company, Wichita, Kansas.

The Permian red-beds of Kansas are re-studied in detail with reference to Cragin's type sections and original classification, to which correlations have been made for 40 years.

Possible horizons of unconformity have been studied critically, the evidence indicating nothing greater than local disconformity, the more pronounced stratigraphic abnormalities usually explained through removal of soluble beds by ground waters, resulting in slumpage and collapse-breciation of the overburden, a condition to be expected of beds in contact with the major dolomite - anhydrite formations: the Stone Corral, the Blaine-Dog Creek, and the Day Creek. The excellence of these evaporite formations as key horizons in red-bed stratigraphy is emphasized in contrast with the variable lithology of the intervening red silstones and their included lenses of orange-polished and micaceous sandstones, on which scant dependence can be placed, as shown on subsurface cross sections.

Cross sections depict a progressive wedging out of the various members of the Wellington and Harper formations against the Sierra Grande arch of eastern Colorado, where beds of approximate Salt Plain age rest on beds near the top of the Pennsylvanian (Wabaunsee) as accepted by the Kansas State Geological Survey, marking the one real unconformity of regional significance discovered.

Permian Sediments of Oklahoma

By SHERWOOD BUSKSTAFF, Geologist, Shell Petroleum Corporation, Tulsa.

The Permian sediments of Oklahoma have been divided by Darsie A. Green into three series named Wanette, Minco, and Upper Permian (unnamed).

The sediments of the lower and middle series range in composition from coarse deltaic clastics on the flanks of the depositional basin to saline precipitates in the deeper parts. Since no considerable unconformity or sharp change in sedimentation occurs in these strata, the boundary between these two lower series in Oklahoma and southern Kansas is defined as the Herington limestone, which is the uppermost of the well developed Lower Permian limestones in this area. Correlation with the Permian strata of Texas, and possible revision of nomenclature, is suggested if discussions now in progress disclose that a reasonably close agreement of opinion can be obtained.

The Upper Permian series is separated from the underlying strata by an unconformity of at least local importance, and is characterized by sediments deposited not by deltaic currents, but by marine currents traversing the basin. The lithology, distribution, and correlation of the strata in this series are discussed; the Marlow formation is recognized as an almost constant unit present over the entire area; various dolomites, gypsums, and breccia-conglomerates are interpreted as facies whose character is determined by their environment of deposition.

Subsurface Cross-Section of the Permian from Texas to Nebraska

By C. L. MOHR, Research Geologist, Indian Territory Illuminating Oil Company, Bartlesville.

The regional correlations of the lower and Middle Permian are illustrated by means of sample logs of 20 wells lying nearly in a straight line from southeastern Irion County, Texas, to Phelps County, Nebraska. Two major disconformities, one at the base of the Wolfcamp and the other at the base of the Leonard, are traceable the entire distance. The lower of the two disconformities lies just under the lowest occurrence of the genus Schwagerina as recently redefined by Dunbar and Skinner and is correlated by the writer with the base of the Thrifty in central Texas, the base of the Pontotoc in southern

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The disconformity at the Leonard-Wolfcamp contact represents a period of erosion and a striking environmental change from marine to semi-marine and saline conditions. An interesting transition occurs in the Leonard and lower Word equivalents from marine shales and limestones in western Texas through semi-marine fossiliferous limestones, dolomites, shales, and anhydrites in west-central Texas to red beds, dolomites, anhydrites and salts in Oklahoma, Kansas, and Nebraska.

The Leonard-Wolfcamp contact occurs immediately below the Elm Creek in central Texas, on top of the Pontotoc in southern Oklahoma, and between the Herington and the Winfield in Kansas and Nebraska. A local disconformity at the base of the San Angelo in Texas and the base of the Cedar Hills in the more northerly wells of Kansas seems to be missing in the deeper part of the Anadarko basin.

Salt, Potash, and Anhydrite in the Castile Formation of Southeast New Mexico

By GEORGE A. KRONLIEN,
Geologist, Midland Exploration Company, Lovington, New Mexico.

The Castile and Rustler formations have a combined thickness of 4450 feet and compose one of the thickest evaporite sections in the world. Continual accumulation of concentrated saline water beneath the surface water in the Delaware basin raised the level of the concentrated water to the point where it caused epoch-making events in Upper Permian history. Capitan reef building and associated petroleum deposition was stopped. The inflow of marine water diminished and deposition of evaporites in the Delaware basin started. This event marks the close of Capitan time and the beginning of Castile.

Subsurface study discloses many hundred feet of depositional relief on the basin floor near the end of Lower Castile time. This condition is responsible for unsuccessful attempts to run a structural correlation across the Delaware basin on the base of the Upper Castile (Main Salt). At present, potash is the mineral product of greatest economic importance in the Castile formation. Two mines are producing from some of the finest potash deposits in the world. A study of two subsurface cross sections shows many interesting features about evaporite sedimentation.

Lakin-Hugoton-Guymon Area of Kansas and Oklahoma

By GLENN G. BARTLE,
Dean, University of Kansas City, and RUFUS M. SMITH,
Geologist, Panhandle Eastern Pipe Line Co., Kansas City, Mo.

The stratigraphy of this region in the southwestern corner of Kansas and the Panhandle of Oklahoma was discussed briefly with especial emphasis on the members of the Big Blue series of the Permian system, Wreford to Herington inclusive, which bear gas. Stratigraphic cross sections were given. A structural contour map of the entire district shows the location of more than 200 gas wells and the elevation of the top of the Herington limestone in each.

Production statistics include the initial and present open flow and rock pressure and the total withdrawals to date.

Structural Development, Yates Area

By JOHN EMERY ADAMS,
Geologist, Standard Oil Company of Texas, Midland, Texas.

The marked Cretaceous surface structure in the Yates area in eastern Pecos County, Texas, was developed by salt solution rather than folding. The solution was active in two stages. In the first, salt was removed from the crest of the dome and the hole left by this solution was filled with clastics. Cretaceous beds were laid down flat over this clastic plug. Post-Cretaceous solution developed a ring syncline around the plug and produced the present surface structure.

Structural Evolution of the Rio Grande Depression near Socorro, New Mexico

By C. E. NEEDHAM,
Professor of Geology and Paleontology, School of Mines, Socorro, New Mexico.

The rocks in the Rio Grande depression and its borders in central New Mexico range in age from pre-Cambrian to Recent, with no representatives of the Cambrian, Ordovician, Silurian, Devonian, or Jurassic. Disconformities, or slight nonconformities, separate the Mississippian and Pennsylvanian systems; the Pennsylvanian and Permian; the Permian and Triassic; the Triassic and Cretaceous. Probably at the close of the Cretaceous, or early in the Tertiary, compressional stresses from the west lifted close folds, some of which are overturned, and at least one prominent zone of overthrusting is known.

This was followed in Miocene time by intense volcanic activity. Continued deformation resulted in the formation of basins, one of which near Socorro was filled with fanglomerate to a thickness of 3000 to 5000 feet. This great thickness of clastic sediments was faulted and highly tilted, probably in late Miocene time, then deeply eroded. Another period of deformation during the Pliocene formed a series of basins which were filled with fan and playa deposits (Santa Fe formation). At the close of the Pliocene, or early in the Pleistocene, renewed faulting took place, blocking out the main trends and border features of the present basins along the Rio Grande. These faults are of the normal type, with their greatest throw toward the valley, thus developing the depression into a great complex graben structure. The Pleistocene was mainly a time of denudation, with enough changes in base level, however, to permit the cutting of a series of pediments. Crustal disturbances at the present time make this region one of the most active earthquake belts in the United States.

Mid-Continent-Pennsylvanian Session

Regional Stratigraphy of the Mid-Continent Area

By ROBERT H. DOTT,
Director, Oklahoma Geological Survey, Norman, Okla.

This paper discussed the distribution and correlation of pre-Cambrian, Paleozoic, and Mesozoic rocks in north Texas, north Louisiana, Arkansas, Oklahoma, Kansas, Missouri, Iowa, and Nebraska. Outcrops of rocks belonging to each system were shown on a series of maps, together with pertinent subsurface data. Correlations of the larger units were shown in a series of charts. The data were compiled almost entirely from the literature.

Regional Structure of the Mid-Continent Area

By IRA H. CRAM,
Division Geologist, The Pure Oil Company, Tulsa.

In order to understand the regional structure of that part of the Mid-Continent area in which Pennsylvanian rocks are exposed, it is necessary to understand the geology of a much broader area, particularly the geology of the area embraced by 30 and 45 North latitude and 91 and 106 West longitude. The regional subsurface structure was portrayed by a map contoured at 1000-foot intervals on the top of the Arbuckle limestone (Cambro-Ordovician) or equivalents. A map showing the present distribution of pre-Pennsylvanian formations or groups of formations explained further the present structure of the Cambro-Ordovician. A cross section through T. 7 N., Oklahoma, was considered a "hand specimen" of Mid-Continent structure. The more important periods of movement responsible for the present structure of the Cambro-Ordovician were discussed. The writer in conclusion points out that the entire area had the same structural history and that to understand thoroughly the structural history of any part of the Mid-Continent is to understand the structural history of the entire area.

Geologic Interpretations of Gravity Anomalies in Atoka and Bryan, Counties, Oklahoma

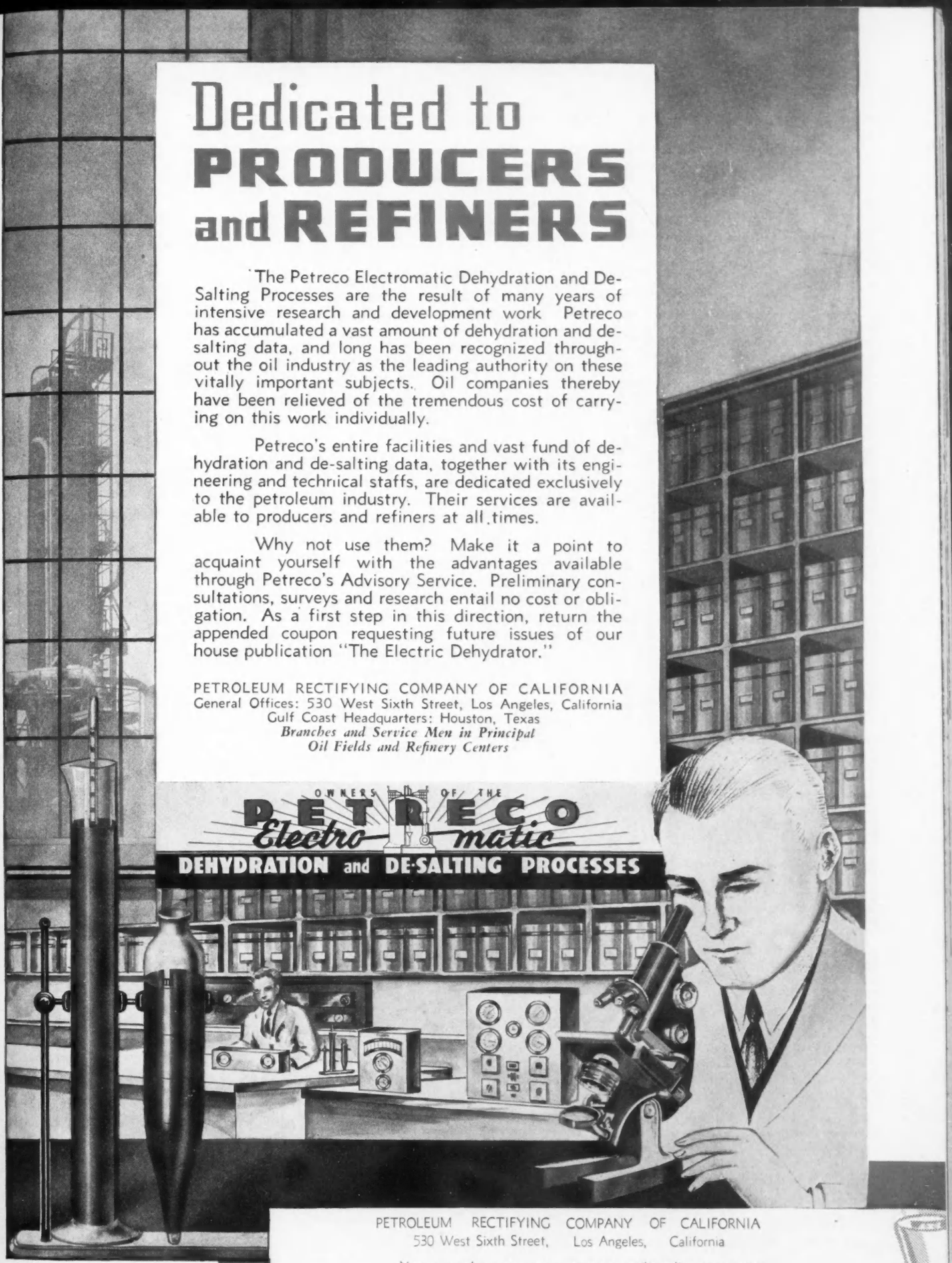
By THOMAS A. HENDRICKS,
U. S. Geological Survey.

Within the last few months a number of gravity observations were made by the United States Coast and Geodetic Survey in Atoka and Bryan counties, Oklahoma, at the request of the Geological Survey, United States Department of the Interior. The stations lie both north and south of the southeastward projection of the fault that forms the north boundary of the Tishomingo granite of the Arbuckle Mountains. They also lie both northwest and southeast of the southward projection of the Choctaw or Ti Valley-Choctaw fault of the Ouachita Mountains. The gravity observations were desired for the purpose of testing the possibility of securing data on the concealed portions of the two faults. The computations are not yet completed (Feb. 1).

Basal Sedimentary Formations in the Wichita Mountains

By CHARLES E. DECKER,
Professor of Paleontology, University of Oklahoma.

There is a great variation in the nature of the formations and the position of the contact with the igneous rocks beneath. Not only is this igneous-sedimentary contact a variable one with marked overlap at some places, but at a new and unmapped outcrop, more than 90 feet of limestone lie beneath



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the Reagan sandstone on the igneous rock and contain igneous fragments up to 30-40 feet above the base. Some calcareous algae occur in the basal part of this limestone. Sections and pictures were shown to illustrate these conditions and samples were displayed.

Oil Production from Pre-Cambrian Rocks in Kansas

By KENNETH K. LANDES,
State Geologist and Assistant Director, Kansas Geological Survey, Lawrence, Kans.

A few wells on the Central Kansas uplift are producing from pre-Cambrian rocks. The occurrence of oil in commercial quantities in rocks of this age is unique. The producing wells are in the Orth pool of Rice County and in the Gurney and Hall pools of Russell County. The pre-Cambrian rock in the Orth pool is quartzite, in the Russell County pools, granite. The latter consists of unweathered pink feldspar, quartz, and biotite. It is in place, and not granite wash or even residual soil derived from granite. The only porosity conceivable in such a rock is that which would be caused by fissuring. It is suggested that the oil migrated into cracks near the top of the pre-Cambrian rock from topographically lower basal conglomerate which laps up on the flanks of the granite hills.

Relationship of Crude Oils from the Mississippi Lime and the Shoestring Sands of the Cherokee Shale in Osage County, Oklahoma, and a part of Southeastern Kansas

By N. WOOD BASS,
U. S. Geological Survey, Tulsa;
and HAROLD M. SMITH,
Bureau of Mines, Bartlesville.

An investigation of the character of the oils from several producing zones in Oklahoma has been made during the past four years by a committee of the Tulsa Geological Society acting as a sub-committee of the research committee of the American Association of Petroleum Geologists. This paper describes the results of the portion of the investigation that was made in Osage County, Oklahoma, and parts of Cowley, Butler and Greenwood counties, Kansas. A total of about 75 samples of crude oil were examined.

In the present investigation crude oil analyses made by the Bureau of Mines Hempel method were compared by the correlation index method, recently developed by Smith. This method employs a simple index number whose derivation is based on the boiling point-specific gravity relationships of pure hydrocarbons. The correlation index as used in studying a Hempel analysis is a number whose magnitude indicates certain characteristics of a fraction distilling at definite temperature intervals. The character of an oil may be shown graphically by plotting the indexes for the entire series of distilled fractions. The correlation index method appears to represent oils more truly than any of the other methods used heretofore.

The oils examined in this investigation occur in four stratigraphic zones, which are, in ascending order (1) the Mississippi lime, which in a few places includes the Burgess sand that lies on the lime, (2) the lower Bartlesville sand, (3) the Bartlesville sand, and (4) the Burbank sand. The investigation showed that the four zones contain three kinds of oils. The lower Bartlesville oil is clearly of a different type from the Bartlesville, Burbank, and Mississippi lime oils. The Bartlesville and Burbank oils are of one general type but are sufficiently different from each other to make their differentiation possible. The Burbank oil is distinctly more paraffinic than the Bartlesville oil. The Mississippi lime oil in Osage County, Oklahoma, is like the Bartlesville oil, and the Mississippi lime oil in Butler County, Kansas, is like the Burbank oil.

The facts disclosed by the investigation lead to the following tentative conclusions: 1. The oils from the lower Bartlesville, Bartlesville, and Burbank sands probably were derived from marsh and near-shore sediments that were deposited during three separate stages of the Cherokee sea, during which stages the sands also were deposited. (2) The oil from the Mississippi lime in Osage County, Oklahoma, was derived from the same sediments as the oil in the Bartlesville sand; the main oil pools in the Mississippi lime in Osage County are in contact with with the source sediments, but some oil has migrated southeastward several miles through the uppermost porous zone of the Mississippi lime.

Geology of Forest City Basin

By H. S. McQUEEN,
Assistant State Geologist, Missouri Geological Survey, Rolla, Mo.

The Forest City basin has been a province known casually to Mid-Continent geologists for many years. In recent months the rather meager geologic details have been subjected to close scrutiny, however, due to an unusual lease campaign of first magnitude throughout the basin.

The present paper describes briefly the general stratigraphy, with particular reference to possible producing horizons; and also describes the interesting regional structure that characterizes the basin. The historical development of the structural grain is analyzed. Although the outline of the basin was definitely established by early Pennsylvanian time, the events in the geological history before and after that time, as they are revealed by the available data, are described.

Some features regarding sedimentation, the composition of ground waters, and an analysis of past drilling operations are summarized.

Preliminary Report on the Morrow Group of Northeastern Oklahoma

By CARL A. MOORE,
Department of Geology, State University of Iowa, Iowa City.

Detailed field work during the summer of 1938, and subsequent insoluble-residue studies, have yielded considerable additional data on the character of the Morrow group of rocks in Adair County, Oklahoma. Sufficient information is at hand to permit the clear recognition of the divisions of the Morrow group into the Hale sandstone at the base and the Bloyd shale above. In addition, the Brentwood and Kessler limestone members of the Bloyd are well developed in Adair County. The Brentwood can generally be recognized throughout the county, and the westward extent of the Kessler has been determined to be about 5 miles west-southwest of Stilwell, Oklahoma. Only by insoluble residue studies is it possible to differentiate between the limestone beds of the Hale formation, and the Brentwood and Kessler limestone members of the Bloyd formation. The Kessler member, in particular, has a diagnostic insoluble residue.

There is a marked disconformable contact between the Pitkin limestone and the Hale sandstone in almost every section measured and studied. In all but a very few cases this contact zone consists of a highly ferruginous, calcareous, conglomeratic bed averaging less than 0.5 foot in thickness. It is invariably phosphatic.

The conclusion is reached that the Morrow group is lower Pottsville in age. In this area the Morrow should be defined to include the beds overlying the Pitkin formation of the Chester group; the disconformity between the two indicates a relatively short time break. The Morrow underlies the Atoka sandstone of upper Pottsville age (lower Des Moines age).

Interpretation of Major Structural Features of the Northern Mid-Continent in Terms of Isostasy

By BRUCE H. HARLTON,
Amerada Petroleum Corporation, Tulsa.

The principles of isostasy postulate the assumption that deposition and erosion control crustal deformation because columns under mountain masses and under areas of sedimentation are in equilibrium. Attention should be focussed to the fact that these columns are of equal weight and are therefore compensated.

Here we are concerned with the decisive factors in establishing the mechanical causes from the effects of isostasy, which have been provided chiefly by sedimentation and erosion. The original folds are developed by lateral compression caused by the collapse of the earth crust on a shrinking interior. But all the major structures as we know them today have been developed by vertical thrust.

A systematic application of isostasy is given to the following major structures: the Wichita-Arbuckle mountains, the Nemaha ridge, the Seminole uplift, and the Central Kansas uplift. A brief reference also was made to the Amarillo ridge, a western continuation of the Wichita mountains, and the Red River arch, a cross fold related to the latter. All the structural features discussed inherited their trend lines from pre-Cambrian time.

Oil-Shale Deposits of Central Texas

By F. B. PLUMMER and
BRUCE GRANT,
Bureau of Economic Geology, University of Texas, Austin.

The deposits of oil shale in the Barnett formation (late Mississippian), which outcrops along the north side of the Llano Uplift in central Texas are briefly described, and maps showing their occurrence and extent are presented. The origin and character of the shale are discussed and its petroliferous content described by a graph and a table of analyses. Although the shale is fairly uniform in thickness and in lithologic character, its oil content varies considerably from place to place. The thickest and most petroliferous spots appear to be located in synclinal areas. It is concluded that this shale is a source of some of the oil produced in the deeper wells in north-central Texas and that a detailed study of the distribution of the petroliferous ma-

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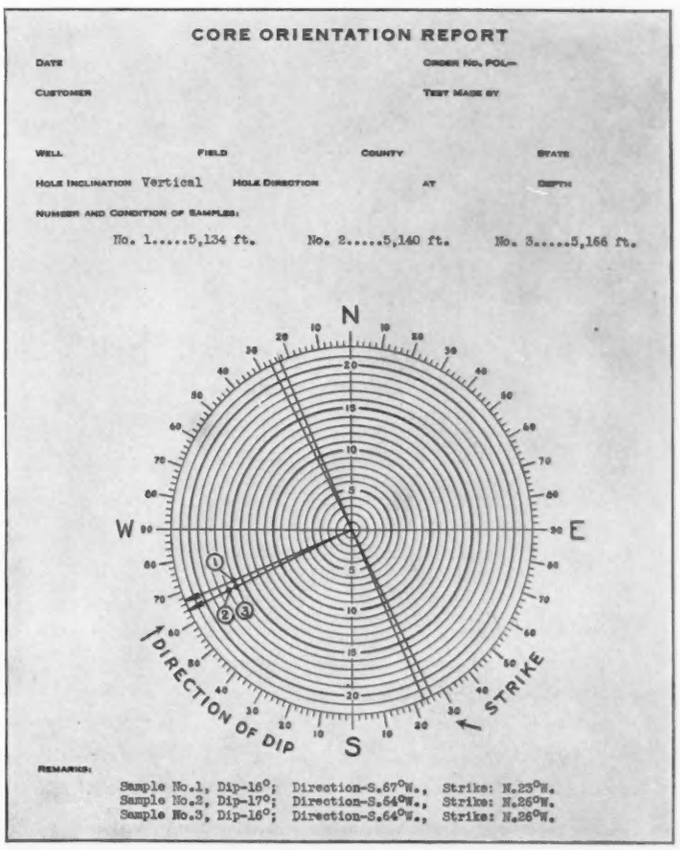

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Reagan Sandstone Sedimentation

By RAY L. SIX,
Professor of Geology, Agricultural and Mechanical College, Stillwater, Oklahoma.

The Reagan sandstone is the basal formation of the Paleozoic section as exposed in the Arbuckle and Wichita Mountains of southern Oklahoma. The formation is of Upper Cambrian age.

In the Wichita Mountains the Reagan sandstone crops out in many places along the northeastern and southern flanks. In both flanks the formation has been distorted and contorted by the Wichita orogeny. In one place the Reagan rests upon a pre-Cambrian metamorphic. At the other exposure it rests upon pre-Cambrian igneous rock. In all places the relationship is unconformable.

In the Arbuckle Mountains the Reagan lies unconformably upon pre-Cambrian granites and other igneous rocks. West of the Washita River the formation occurs around the East and West Timbered Hills. East of the Washita River five outcrops occur along the borders of the Tishomingo and other granites. The most extensive outcrops occur west of Troy and south of Mill Creek and north of Ravia.

The character of the environment in which the Reagan was deposited was discussed in some detail. The origin of the high glauconite and hematite content of some members was considered. Its relationship to other Cambrian sediments of the Central United States was developed. The conglomerate, basal and otherwise, shale, sand, and calcareous phases were described in detail.

Mississippi Embayment

The Sparta-Wilcox Trend

By JOHN D. TODD and
FRANK C. ROPER,
Consulting Geologists, Houston.

This recently discovered productive trend of the Upper Gulf Coast of Texas and Louisiana is considered to be limited by the —5000-foot contour on the north and the —9000-foot contour on the south.

The sand conditions are such that this trend is comparable in productive possibilities to the other major producing trends of the Gulf Coast.

The Saxet Field, Nueces County, Texas

By J. C. POOLE,
Barnsdall Oil Company,
Corpus Christi, Texas.

The Saxet field was discovered in 1923 and was known only as a gas field until the latter part of 1930 when the first oil well was completed. Oil development was slow until 1935 because of class of wells obtained. Core records of early wells indicated that the oil and gas sands tasted salty which resulted in the passing up of commercial sands.

In September, 1935, an excellent high-gravity oil well was completed which led to a very rapid development of the field which to date numbers 15 more or less regularly developed oil sands and some 13 erratic ones, with a proved area of some 8300 acres. The age of production ranges from the Oakville through the Frio.

From a geological standpoint, the most interesting feature of the field is the intricate faulting problem presented. First, the field is divided by a large curved fault trending northeast-southwest which effectively separates the area into two separate pools.

Oil accumulation on both sides is further complicated by a series of minor faults. The major fault is downthrown toward the Coast. The minor faults on the upthrown side of the major fault form horsts and grabens while the minor faults on the downthrown side of the major fault are apparently all of a compensating nature and are downthrown toward the major fault.

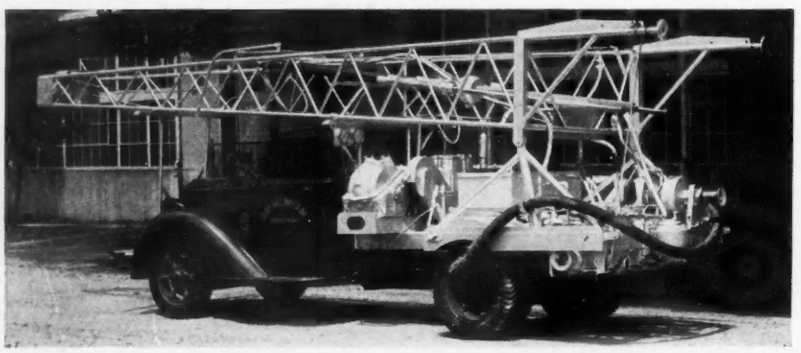
The Corpus Christi field on the east, the Turkey Creek field on the west, and the Baldwin field on the south, may all very easily be connected with, and be a part of, the Saxet field.

At present there are about 600 producing wells with a daily allowable of approximately 40,000 barrels. Accumulative production to date is approximately 30,000,000 barrels.

Fossil Horizons of the Gulf Coast

By F. W. ROLSHAUSEN,
Humble Oil & Refining Company,
Houston, Texas.

As a result of sample examinations over a period of 20 years, it has been found that key fossils are confined to certain areas. These areas have the same general strike as the present Gulf Coast. Although



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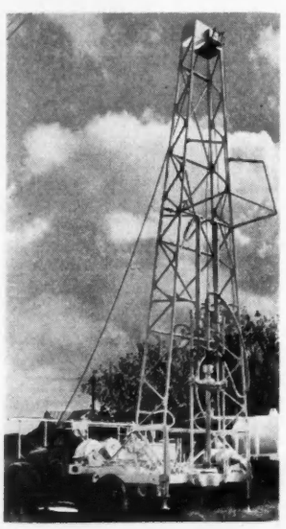

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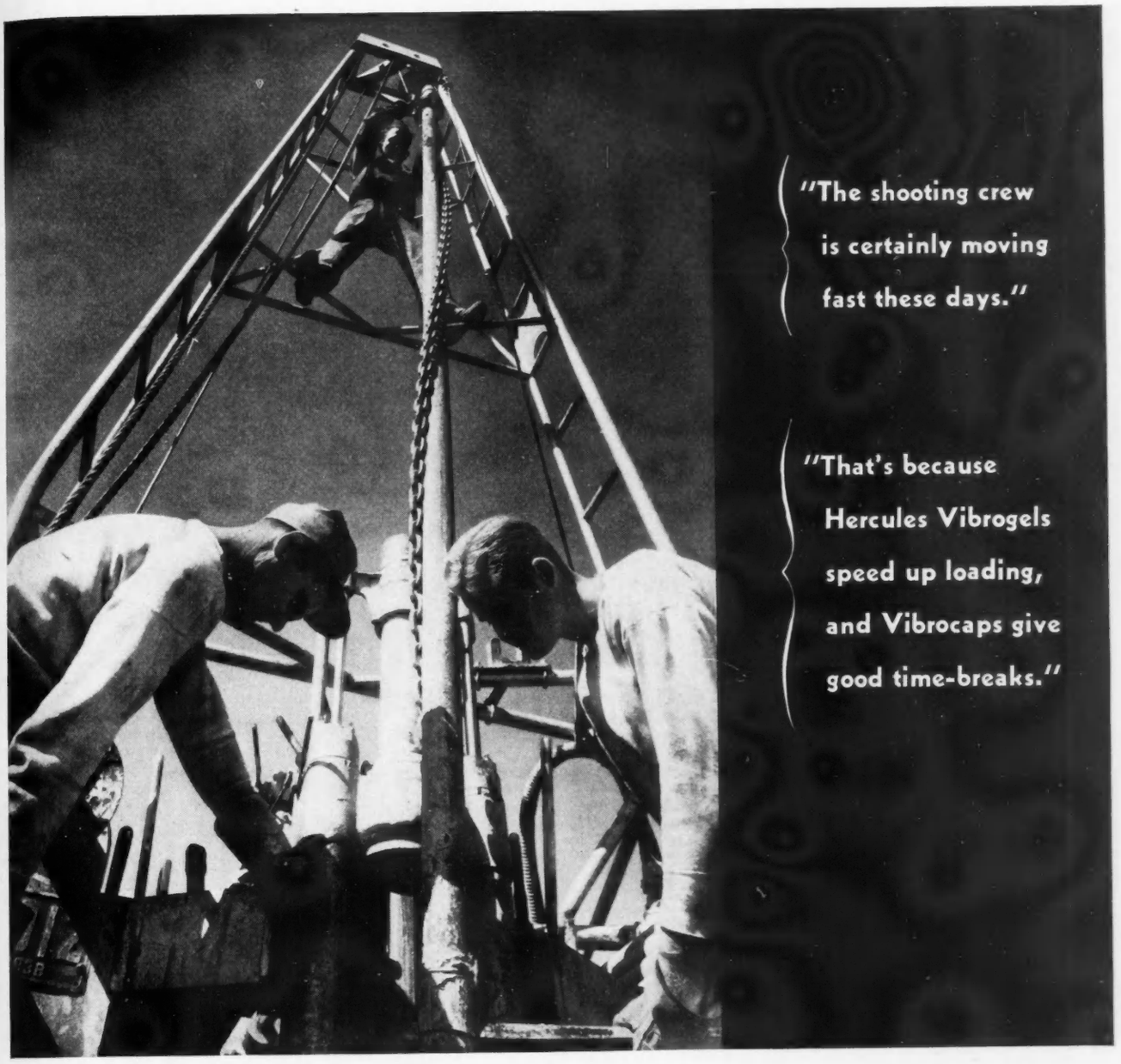
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the areas overlap to some extent, numerous key fossils have well defined limits.

Amelia Field, Jefferson County, Texas

By ED J. HAMNER,
Humble Oil & Refining Company,
Genoa, Texas.

The Amelia oil field, located 5 miles west of Beaumont, Jefferson County, Texas, was discovered in 1936. Geophysical evidence of this structure was responsible for the discovery but was rather indefinite as to the true structural conditions. No surface geological indications of structure are present. The sub-surface conditions are those of an elliptical, flat dome, probably underlain by a deeply buried salt mass, and further complicated by a large normal fault striking parallel with the long axis of the dome. This fault has the unusual distinction of having production from its downthrown side while the upthrown side is dry.

The producing sand, locally known as the "Langham sand," belongs to the Oligocene Frio formation, and is found from 6694 to 6785 feet although only the last 20 feet is productive of oil. The sand is a thick, blanket sand body literally surrounded by salt water sands and has an extensive gas cap above the oil zone.

The development of this field was interesting, not only from the disclosure of its peculiar geological features, but also from the standpoint of unusually difficult well completion problems. A new method of completing high ratio wells by squeeze cementing was introduced at Amelia and has since been used extensively in other fields throughout the Gulf Coast region.

Producing Sands of South Texas Above the Top of the Jackson Formation

By JOHN M. CLAYTON,
Gulf Oil Corporation,
Corpus Christi, Texas.

Principal producing sands above the top of the Jackson formation in South Texas are stratigraphically divided into groups or sand series which are generally consistent throughout the entire coastal trend. The object of this paper was to discuss these groups and their comparative importance.

The construction of two dip sections in Texas, one dip section in Louisiana, and a cross section extending through the East Texas and the Louisiana embayments to the Mississippi River, have disclosed the regional trend of the Eocene in its downdip to marine facies. The use of electrical logs upon which the paleontological points have been superimposed for these sections, has made it possible to recognize the change in facies and the foraminiferal zones suitable for correlation. The trends of potential production in the Cockfield, Sparta, and Wilcox sands form the concluding statements of this paper.

The Emba Salt-Dome Region, U.S.S.R., and Some Comparison with Other Salt-Dome Regions

By C. W. SANDERS, JR.,
Shell Petroleum Corporation,
Houston, Texas.

Although oil has been produced since 1908 from salt domes in the Emba area, which lies between the south end of the Ural Mountains and the north shore of the Caspian Sea, the geological situation in that region has escaped the attention of many American geologists. Salt-dome geologists of the Gulf Coast region have frequently had their attention directed to the salt structures of Germany and of Roumania, whereas greater resemblance to the Gulf Coast in many respects is to be found in the Emba district, where more than 100 salt domes are known, and many more suspected, in an area about the size of the Gulf Coast exclusive of South Texas. Only six domes are being exploited but many others have shown evidence of accumulations of oil and gas. Production has been found in "Permo-Triassic," Jurassic, and Cretaceous strata, but chiefly in Jurassic sands. The oil reserves appear to be commercially important but do not rank with those of the Gulf Coast. Total oil production to date is estimated at about 41 million barrels.

The Emba mother salt series is almost certainly of Permian age—probably Upper Permian. The overburden is much thinner than that of the Gulf Coast, consisting chiefly of Mesozoic strata, with local patches of Tertiary sediments. The coastal area is blanketed with a mantle of Quaternary (Caspian) beds. Many of the shallow salt structures are larger than any Gulf Coast shallow domes. Future exploration will probably reveal an increasingly larger percentage of deep domes.

More is known about pre-salt strata in the Emba region than in the Gulf Coast because of the outcrops in the southern Urals, where the Upper Carboniferous and Permian sections have been rather closely correlated with the Pennsylvanian and Permian sections of the Mid-Continent region, largely on the basis of the ammonites contained.

Benavides Field, Duval County, Texas

By R. C. BOWLES,
Standard Oil Company of
Kansas, Houston, Texas.

The discovery sand is in the Jackson group, Eocene system, Tertiary era. Five additional sands of Jackson age have been proved for commercial oil production. Also one sand of the early Oligocene system of the Tertiary era is producing oil.

Structural irregularity is expressed by folding and faulting. Gas and oil accumulation in certain sand horizons is due to closure within the individual sands as they grade into shale across the fold and in the normal updip direction. In the other producing sands the gas and oil accumulation is due to structural closure.

Deposition of the Lissie and Beaumont Formations of the Texas Gulf Coast

By R. J. METCALF,
Ohio Oil Company, Houston.

The Lissie formation was deposited on a peneplained surface. Later action of major streams produced a series of alluvial plains near the coast on which the later phases of the Lissie and the Beaumont were deposited under a flood plain environment. The Beaumont was a continuation of the same cycle of deposition by a series of distributaries on a plain of very low relief.

Geology of Sulphur Bluff Field, Hopkins County, Texas

By C. LATHROP HEROLD,
Shell Petroleum Corporation, Houston.

The Sulphur Bluff oil field, produces from the upper sands of the Paluxy formation (Lower Cretaceous), which occurs at an average depth of 4450 feet. Structural closure against a normal fault forms the trap in which the oil accumulated. The productive area, three miles long and half a mile wide, is on the upthrown or south side of the east-west fault, which is a displacement ranging from 350-400 feet in the Eocene (surface outcrop) to 750 feet (estimated) in the Lower Cretaceous. First evidence of favorable structural conditions was disclosed by surface mapping, supplemented by core drilling and later confirmed by subsurface data obtained from several dry holes drilled to the Woodbine formation (Upper Cretaceous).

A total of 74 producing wells have been drilled, resulting in an average density of one well to 12 acres within the productive limits which are virtually defined. A deep test, which penetrated 434 feet into the Travis Peak formation (Lower Cretaceous), was drilled in 1938, but it failed to encounter commercial oil production below the Paluxy.

Eastern Interior Basin

Mississippian Border of Eastern Interior Basin

By J. MARVIN WELLER,
State Geological Survey, Urbana, Ill.,
and A. H. SUTTON,
Geology Department, University of
Illinois, Urbana.

This paper briefly discussed the stratigraphy, paleontology, sedimentation, structure, and listed petroleum-bearing beds of the Mississippian system in Illinois, Indiana, western Kentucky, eastern Missouri, and southeastern Iowa as based upon the published and unpublished investigations of more than 25 geologists and their numerous assistants, who worked mainly under the auspices of the various state geological surveys. Slight innovations in the classification and the interpretation of the Mississippian system were proposed and possible errors in nomenclature and correlation were pointed out. Accompanying maps showed the areal geology from Mercer County, Illinois, to Putnam County, Indiana, and included more than 50 15-minute quadrangles which have been studied in detail.

Subsurface Geology of the Mississippian System in Illinois

By L. E. WORKMAN and
J. NORMAN PAYNE,
Illinois State Geological Survey,
Urbana, Illinois.

The Chester series underlies most of the southern half of Illinois east of East St. Louis. Except where they have been removed by post-Chester erosion, all the formations in the standard Chester section can be identified in the area. Producing horizons are the Cypress and Bethel sandstones, both of which are in the lower part of the Chester series. The maximum known thickness is 1450 feet at a point in the most southerly portion of the area. Because of northward thinning of individual formations, the original thickness of the entire section in the northern part of the area was probably half of this. Uplift, warping and peneplanation previous to the deposition of Pennsylvanian sediments caused truncation of the series throughout the basin and scalping of local structures. The isopach map indicates two major pre-Pennsylvanian anticlinal areas in which are located a large proportion of the Illinois oil fields, one the LaSalle anticline, and the other an uplift running southeast from the region of Sorento.

The Iowa, or Lower Mississippian series, consists of the formations belonging to the Kinderhook, Osage, and Meramec groups. The Kinderhook group is made up almost entirely of shales with one or two thin limestones near the top. The Osage group is composed dominantly of silty shale and siltstone throughout the Illinois Basin except in the extreme western and

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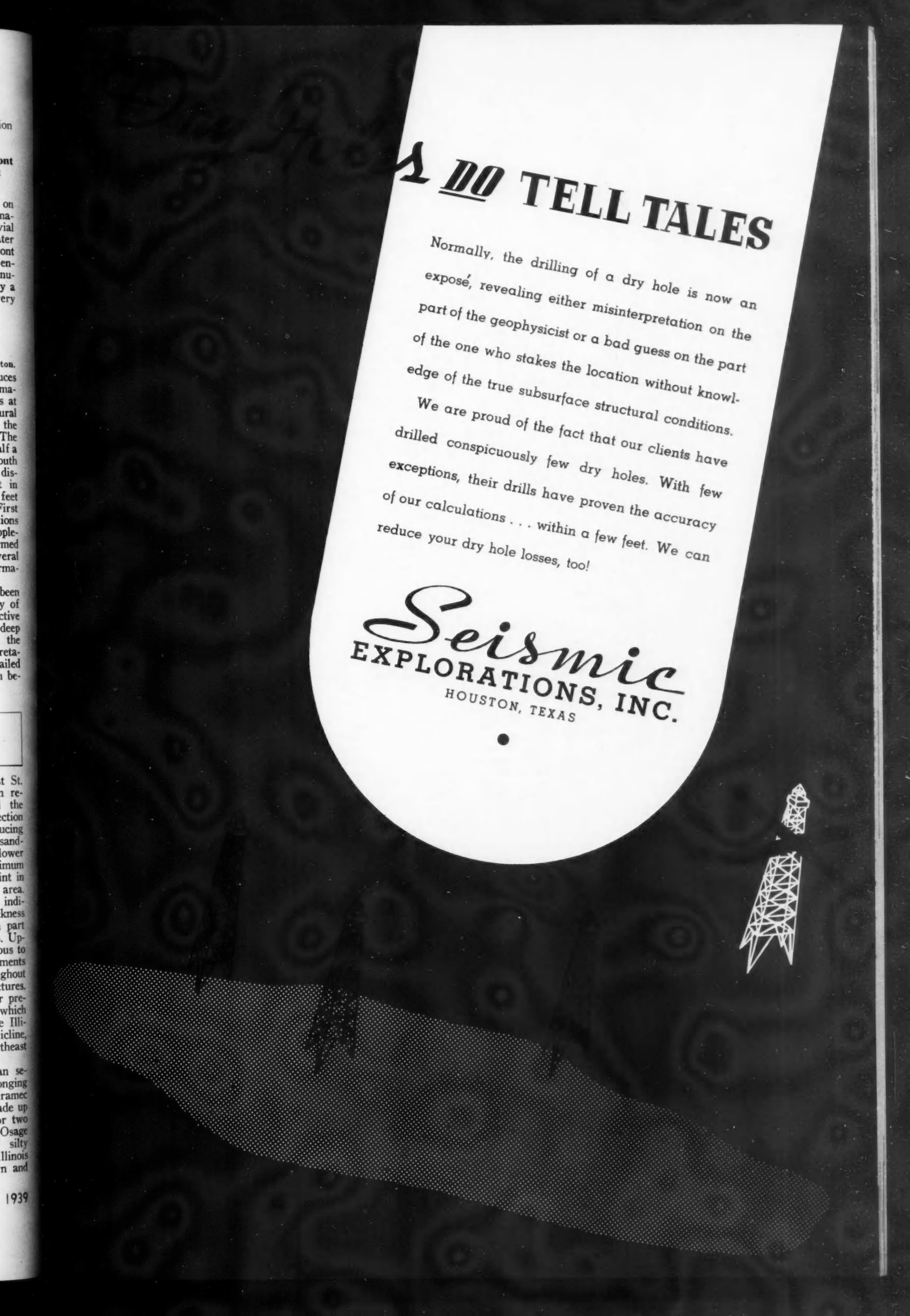

northwestern parts where the group can be separated into the typical Fern Glen, Burlington, Keokuk, and Warsaw formations. The Meramec group, consisting of the Salem, St. Louis, and Ste. Genevieve formations, is composed almost entirely of limestone and dolomite which lend themselves readily to separation by means of insoluble residues. The Iowa series reaches a maximum thickness of 2000 feet in Gallatin County. This is probably due to thickening of the individual formations. Local variations in the thickness of the series and beveling of upper Iowa strata in Bond and Clark counties indicate some pre-Chester folding.

Geology of the Basin Fields in Southeastern Illinois

By LYNN K. LEE,
The Pure Oil Company,
Olney, Illinois.

The Basin fields of southeastern Illinois are so named because of being located near the center of the Illinois basin. Production has so far been obtained in Wayne, Clay, and Richland counties in a series of fields extending for 45 miles north and south. It is highly improbable that the producing areas will connect.

Production was discovered in March, and active development was commenced in May, 1937. To January, 1939, the production from 475 wells was 12,416,000 barrels. Daily average production at that time was 66 barrels per well. Large initial productions are common, and decline is rapid for the first few months. Twenty-acre spacing is prevalent.

All except the Flora field are associated with a general north-south anticline, which has a slight southward plunge of the axis into the deeper part of the basin. Accumulation has for the most part been on local closures along the axis, but some production has been obtained from noses and terraces on the flanks on the main feature.

Little is known of the pre-Mississippian structural history. The known period of major deformation was post-Mississippian pre-Pennsylvanian; however, subsequent to this there was recurrent folding.

Production is from oolitic limestone of the Ste. Genevieve formation (McClosky) except in the north Noble field, where it is from the Cypress (Weiler) sandstone, the former being in the upper part of the Lower Mississippian and the lower part of the middle Chester.

The Cypress is a widespread sandstone but locally subject to lensing into beds of sands and shales and even completely to shale. It is believed that Chester sandstone production will become more important as development extends northward. The oolitic character of the Ste. Genevieve is persistent over the area; however, porosity occurs in lenses of variable proportions laterally and vertically. Approximately 10 percent of the holes drilled within the limits of production are dry because of lack of porosity in the lime; however, porosity is more persistent on the structures than in the synclines. The relation of the contact of the Ste. Genevieve to the overlying Chester is controversial; however, the data do not indicate an angular unconformity of any extent at this contact in the deeper part of the basin.

Small production has been obtained from the pre-Mississippian beds on the east and west flanks of the basin; however, since no test below the Mississippian has so far been drilled on structure in the area under consideration, the deeper possibilities for production are highly speculative.

The Salem Field, Marion County, Illinois

By H. H. ARNOLD, JR.,
The Texas Company, Tulsa.

The Salem oil field, Marion County, Illinois, was discovered by The Texas Company on July 1, 1938. During the week of January 7, 1939, the field ranked seventh in the United States on the basis of daily production. Six months after the discovery date the field has produced a total of 2,894,964 barrels.

All producing formations of the Salem field are Mississippian in age and include the Benoist sand, the Aux Vases sand, and the McClosky zone. At present the Benoist sand is the principal zone being developed; however, drilling to the McClosky zone is increasing in intensity.

A geologic study of the Illinois basin indicates early periods of structural adjustment. Marked zones of influence are thought to have been established by these movements. In certain areas of the basin late Mississippian and early Pennsylvanian structural developments have a close relationship to these early established zones.

Subsurface mapping of the Salem field on the Benoist sand and the McClosky zone indicates close similarity in structural definition. No increase of structural relief with depth is apparent on the data supplied by present drilling.

Comparison of the Pennsylvanian Des Moines Series of Southern Iowa and Northern Missouri

By L. M. CLINE,
Iowa Geological Survey,
Ames, Iowa.

A series of carefully measured outcrop sections made in a strike traverse from Guthrie County, Iowa, to counties in Missouri south of the Missouri River shows that most of the limestone and coal units of the Des Moines series persist throughout their area of outcrop in Iowa and that there is very little lateral variation in lithology. Certain of the limestones, for example the Ardmore, are so distinctive that they are useful key beds in mapping although some of them are very thin. Most of the units that the Iowa Geological Survey recognizes can be correlated with the units that the Missouri Survey recognizes in northern Missouri.

Paleontology

Permian Ammonoid Zones

By A. K. MILLER,
Associate Professor of Geology,
Iowa State University, Ames,
and W. M. FURNISH,
Research Associate in Geology,
Iowa State University, Ames.

Ammonoids are one of the best groups of fossils for the correlation of late Paleozoic strata. Because they were free-swimming mobile creatures, they were able to migrate long distances, and closely similar forms are found all over the world. Specimens were studied from essentially all the important Permian localities, and conclusions therefore were based on direct observations as well as on the literature.

Sequences of Permian ammonoid zones were first established independently and almost contemporaneously by Bose in West Texas and by Haniel in Timor. Their work has since been amplified, refined, and perfected by other authors as new discoveries were made. This paper was an attempt to bring the entire study up to date, adding many new observations and summarizing the available data in the form of correlation charts. These charts emphasized the fact that the Permian of West Texas contains a nearly complete sequence of ammonoids and serves well as a standard for the rest of the world.

Invertebrate Fauna of the Late Permian Whitehorse Sandstone

By NORMAN D. NEWELL,
Assistant Professor of Geology,
University of Wisconsin, Madison
J. BROOKS KNIGHT,
Curator of Paleozoic Invertebrates,
Princeton University, Princeton, N. J.,
RAYMOND C. MOORE,
State Geologist and Director,
Kansas Geological Survey Lawrence.
KENNETH BRILL,
Graduate Student, University of
Michigan, Ann Arbor.

For several years the location of the Paleozoic-Mesozoic boundary in the redbeds of the Mid-Continent region has been a subject for debate. The controversy has centered on the age of the "Custer" group, as originally defined by Robert Roth. The Custer beds are underlain unconformably by rocks containing faunas indicating either a Leonard or Word age. The Custer group is overlain unconformably by the Dockum beds containing a fauna of terrestrial invertebrates of undoubted late Triassic age. A fauna of marine invertebrates occurs in deposits of cross-bedded sandstone and dolomite in the Whitehorse sandstone of the Custer group. Beede studied this fauna and assigned it to the Permian. Following Beede's conclusion the beds of the Whitehorse generally have been regarded as Permian in age, but some geologists have looked upon Beede's faunal evidence as inconclusive, and have referred the entire Custer to the Triassic.

If the Whitehorse beds could be traced at the surface continuously from northwestern Texas into the nearby Guadalupe Mountains of southeastern New Mexico and Trans-Pecos Texas it would be possible to date the Whitehorse sandstone relative to the Permian of the classic Guadalupian section. The red-beds of the Whitehorse sandstone and associated strata are covered, however, by late Triassic and Tertiary deposits in much of northwestern Texas, so that continuity in the direction of the West Texas outcrops can be studied only from the records of deep borings.

The fossiliferous beds (Whitehorse) of the Custer group are certainly late Permian in age. Evidence, both faunal and stratigraphic, indicates at least partial equivalency with the Carlsbad limestone of southeastern New Mexico. The age of the Carlsbad limestone appears at the present time to be controversial. It may be of Capitan or post-Capitan age, but the preponderance of opinion of field and subsurface geologists indicates a Capitan age. The faunal evidence presented here may be interpreted either way, for Capitan, or post-Capitan age for the Whitehorse sandstone and equivalents.

Didymograptus protobifidus in North America

By CHARLES E. DECKER,
Professor of Paleontology,
University of Oklahoma.

Differentiated first in England and noted in Australia, the species has been secured from four different outcrops in Oklahoma,

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and in material sent to the writer from Marathon, Texas, and Smithville, Arkansas. It is thought also that this species occurs in the Deepkill of eastern New York. Some of the forms from the various American regions were described and illustrated and their stratigraphic importance noted.

A New Graptolite Horizon in Wisconsin

By CHARLES E. DECKER,
Professor of Paletontology,
University of Oklahoma; and
EDWARD A. FREDERICKSON,
Graduate Student, University
of Wisconsin.

A single species of graptolite from the Platteville limestone of Wisconsin was described and illustrations presented for comparison of an identical species from the Criner Hills and Arbuckle Mountains of Oklahoma and the Ordovician of Sweden, along with a brief section to show the position of the graptolite horizon in the Platteville limestone.

A New Palentologic Correlation Method

By H. B. STENZEL and
R. W. CUMLEY,
Bureau of Economic Geology,
University of Texas.

The gastropod species *Turricula gabbii* (Conrad) is one of the most common fossils of the middle Eocene Claiborne group of east and central Texas. This species and its ancestors can be traced through about 500 feet of beds. During its evolution the number of riblets on the protoconch decreases from about 188 to 85. This decrease in the number of riblets is so gradual and can be measured to such accuracy that it can be used for an exact correlation of the beds. The results are similar to those obtained from a study of Jurassic ammonites in England.

Conodont Fauna of the Seminole of Northeastern Oklahoma

By DANIEL J. JONES,
Phillips Petroleum Company,
Bartlesville, Oklahoma.

In two preliminary reports on the conodont fauna of the black shale horizon near Collinsville, Oklahoma, presented before the Society of Economic Paleontologists and Mineralogists, the writer has described the fauna as occurring in the Nowata shale. However, recent field work by Dott, Murray, and others has shown that this conodont-bearing horizon lies within the Seminole formation.

The paper dealth with new information obtained recently concerning the significance of the previously reported conodont assemblages, and with the classification of these assemblages into definite groups according to the diagnostic polygnathid form present; each group contains its characteristic suites of conodont pairs. In addition, three new genera of conodonts are erected, together with several new species. These were briefly described and figured.

It is suggested that, due to the fact that the preponderance of the systematic taxonomy of conodonts in the literature has been erected on the basis of the individual form, this classification be continued for the benefit of workers in stratigraphic paleontology, with the understanding that the individual conodont is not the true morphological unit. It must be realized that the true individual, whatever its zoological affinities, possessed many different generic and specific forms within one oral or buccal apparatus. This dual system of conodont nomenclature and classification will, it is believed, satisfy both the morphologic and stratigraphic paleontologists. A proposed morphological classification of the Seminole assemblages was presented in preliminary form, as well as a new simplified grouping based upon characteristics of the individual specimen. These groupings were submitted for suggestion and criticism.

Foraminifera from the Grayson Formation of Northern Texas

By HELEN TAPPAN,
Graduate Student,
University of Oklahoma.

Ninety species of foraminifera were described and illustrated from the Grayson formation of northern Texas and southern Oklahoma, representing more than double the number of species hitherto listed from this formation. This fauna included one new genus, 33 new species, and one new variety. Thirty-nine species of the family Lagenidae were found, with ten of the Polymorphinidae and nine of the Buliminidae, these three families comprising nearly thwo-thirds of the entire fauna. The geologic range of the genera Pseudopolymorphina, Gumbelitria, and Schackoina was extended to include the Lower Cretaceous, and the geologic and geographic ranges of many species are extended. The foraminiferal evidence supports that of the upper Grayson ammonites in the correlation of this formation as Upper Albien in age, and the equivalent of the Albien of France and the Gault of England and Germany.

An Intepretation of the Miocene Formation of South Louisiana

By ALVA C. ELLISOR,
Research Geologist and Paleontologist,
Humble Oil & Refining Company.

The area under discussion is south of a line drawn from the southern part of Beauregard Parish to the southern part of St. Tammany Parish, extending into Mississippi far enough to include the Gulf's R. J. Williams 1 in Hancock County. A series of eight strike sections and one dip section were given, showing the variation in depositional conditions of the Miocene sediments, the transition of brackish water fauna into Marine, and the faunal zones present which are of value for correlation. Plates showing the characteristic fauna were included.

Some New Species of Larger Foraminifera from the Claiborne of Mississippi

By DONALD W. GRAVELL, and
MARCUS A. HANNA,
Paleontologist, Gulf Oil Corp.

The new species of *Camerina* and one new species of *Lepidocyclina* (Lepidocyclina) were described and figured from the subsurface Claiborne Eocene of Mississippi.

Some Species of Taxtularia from the Tertiary of Texas

By FLAVY E. DAVIS,
Paleontologist, Gulf Oil Corp.

Fourteen species and varieties of *Textularia* from Tertiary of Texas redescribed and refigured, and six new species and two new varieties described and figured. Discussion of stratigraphic and geologic distribution of these species.

Some Middle Tertiary Smaller Foraminifera from Subsurface Beds of Jefferson County, Texas

By J. B. GARRETT,
Stanolind Oil Gas Company.

Thirteen new species and two new varieties of smaller foraminifera were described from strata known in the Gulf Coast as the *Discorbis, Heterostegina,* and *Marginulina* zones.

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Geophysicists

For its annual meeting in Oklahoma City, March 21, 22 and 23, the Society of Exploration Geophysicists carried out a program to match the development of geophysical methods in relation to oil discovery. The morning of the second day was given over to a joint session with the American Association of Petroleum Geologists whose annual meeting opened that day. At that time F. M. Kannestine, president of the geophysical group, addressed the combined meeting on "The Relationship of Geophysics to Geology."

The program for the three days was:

"An Areal Plan of Mapping Subsurface Structure by Refraction Shooting," L. W. Gardner, Gulf Research & Development Company.

"An Experimental Study of Changes in Reflection Character with Geophone Depth," H. M. Houghton, Geophysical Research Corporation.

"The Physical Significance of Correlation Coefficients," W. M. Rust, Jr., Humble Oil & Refining Company.

"Some Comparisons Between Straight and Curved Seismic Paths," M. Mott-Smith, Independent Exploration Company.

"Some Experiments on the Characteristics of High Frequency Waves in the Earth," L. G. Howell, C. H. Kean and R. R. Thompson, Humble Oil & Refining Company.

"La Rosa Field, a Geophysical Discovery," Barney Fisher, Coronado Corporation.

"Geophone Band Tests," R. S. Dahlberg, Jr., Carter Oil Company.

"Dip Reflections on Two Gulf Coast Faults," F. F. Campbell, Geophysical Research Corporation.

"Velocity Stratification as an Aid to Correlation," Roland F. Beers, Geotechnical Corporation.

"A Proposed Method for Orienting Cores," V. V. Vacquier, Gulf Research & Development Company.

"A Note on a Device for Rapid Adjustment of Misclosures," M. M. Slotnick, Humble Oil & Refining Company.

"Determination of Density for Reduction of Gravimeter Observations," L. L. Nettleton, Gulf Research & Development Company.

"Terrain Corrections for Gravimeter Stations," S. Hammer, Gulf Research & Development Company.

"Model, Mechanism and Field Tests of a New Type Gravity-Meter," Hart Brown, Brown Gravity-Meter Company.

"Transients in Electrical Prospecting —II," Paul F. Hawley, Stanolind Oil & Gas Company.

"Recent Developments in Eltran Prospecting," P. W. Kipsch, Subterrex.

"An Eltran Survey of Yoakum County, Texas," J. L. Lake, Subterrex.

"Shallow Resistivity Survey at South Elton, Louisiana," E. E. Blondeau, Geophysical Research Corporation.

"A Note on the Seismic Electric Effect," R. R. Thompson, Humble Oil & Refining Company.

"Gramma-Ray Well Logging," L. G. Howell and Alex Frosch, Humble Oil & Refining Company.

"The Electrical Model Method for Structural Investigations," I. E. Rosenzweig, Institute of Electrotechnics at Lwow, Poland.

"The Divining Rod," Herbert Hoover, Jr., United Geophysical Company.

"The Determination of Water Sources in Oil Wells," Clarence R. Dale, Dale Service Corporation and Burton L. Delleney, Schlumberger Well Surveying Corporation.

"Concentrations of Hydrocarbons in the Earth," Eugene McDermott, Geophysical Service, Inc.

"On Geo-Chemical Prospecting—I," L. Horvitz, Subterrex.

"On the Strategy and Tactics of Exploration for Petroleum—III," E. E. Rosaire, Subterrex.

"Geophysical Education in a Department of Geophysics," James B. Macelwane, St. Louis University.

"Geophysical Education at an Engineering Institution," Dart Wantland, Colorado School of Mines.

"Core Samples from the Ocean Deeps," C. S. Piggott, Carnegie Institution of Washington.

"Exploring Drill Holes by Sample Taking Bullets to Supplement Electrical Logging," Eugene C. Leonardon and D. C. McCann, Schlumberger Well Surveying Corporation.

"The Role of Isostasy in Mountain Building," Malvin G. Hoffman, Midco Oil Corporation.

Simmons new president of Western Petroleum Refiners

The Western Petroleum Refiners Association at its twenty-seventh annual meeting in San Antonio, March 19-21, elected as its new president L. B. Simmons, president of Rock Island Refining Company, Duncan, Oklahoma. R. W. McDowell, vice president of Mid-Continent Petroleum Corporation, Tulsa, was elected executive vice president. Other vice presidents elected at this meeting were C. L. Henderson, vice president, Vickers Petroleum Company, Wichita, Kansas; C. W. Cahoon, Jr., president Olney Oil & Refining Company, Wichita Falls, Texas, and T. M. Martin, vice president, Lion Oil Refining Company, El Dorado, Arkansas. Simmons succeeds C. M. Boggs, president of Kanotex Refining Company, Arkansas City, Kansas, who has served the association in that capacity for the past four years. Following the recent resignation of A. V. Borque who was secretary and treasurer, John Day, economist and statistician for the group, has been appointed acting secretary.

Two sessions during the meeting were devoted to study of general economic trends and developments and two sessions were given over to study of technical subjects. Henry M. Busch of the department of sociology of Western Reserve University, Cleveland, Ohio, lectured on "The Present World Situation and Its Implications for the Oil Industry." Brigadier General F. L. Martin of the U. S. Air Corps, Barksdale Field, Louisiana, spoke on the progress in aviation and the contributions to such progress by the petroleum industry. Fayette B. Dow, Washington counsel for the association, discussed "Public Announcements of Anti-Trust Law Enforcement Policies." Glen Griswold of New York lectured on "The Economics and Public Problems of the Oil Industry." Victor H. Scales, director of the department of public relations, American Petroleum Institute, discussed public relations activities and plans of the petroleum industry under the title "New Attitudes."

South Texas A.S.M.E. to meet in Houston

Herbert Allen, chief engineer of Cameron Iron Works and Abercrombie Pump Company will discuss "The Design of Control Equipment for High Pressure Oil Wells" at the March 30 meeting of the South Texas Section of the American Society of Mechanical Engineers.

Allen has been closely associated with development of blowout preventers and pumps since graduating from Rice Institute in 1930. His talk will deal with the mechanical design problems arising in the control of wells having pressures up to 8000 pounds.

The meeting will be held in the mechanical laboratory of Rice Institute, and will be called to order at 7:30 p. m.

Capitols

[*Continued from page 64*]

promises to oppose the sales tax, and at the end of the week, the problem seemed to be in a hopeless snarl.

Arizona proposes longer term for state land leases

The Arizona legislature, which adjourned last week, approved a resolution providing for a referendum vote on a constitutional amendment to allow leasing of state lands up to a maximum of 20 years for oil and gas development.

Subject to adoption of the amendment is an approved bill which sets up a code to control such development, providing for prospecting permits up to 5 years on payment of an initial fee of not less than 10 cents an acre, with renewal at not less than 20 cents an acre a year. Operating leases carrying one eighth royalty and 50 cents an acre rental provisions would replace prospecting permits in the event production is obtained in commercial quantities, and such leases would be valid up to 20 years.

The present leasing limitation, set by the constitution, is 5 years.

Kansas revised proration law passes both houses

The revised proration statute by which special allowables will be illegal in Kansas seems certain to become law. Last week it was approved by the house of representatives following passage by the senate. The measure was a part of the oil program of the Kansas governor, Payne H. Ratner.

Market Situation

Future prospects of markets dimmed by lifting of Saturday shutdowns in Texas . . . Gasoline gains 1/8 cent despite another large increase in stocks

Markets disturbed by lifting of shutdowns

The oil industry's markets were appreciably disturbed last week by the announcement that Saturday shutdowns would be lifted in Texas fields during April, whereas the wells of the state have been closed in heretofore on Saturday and Sunday of each week.

It was calculated that several million barrels of crude oil would be forced into storage under the 6-day production weeks, and that excessive refinery runs would be promoted.

Whether or not the established prices for crude oil and refined products could be maintained under the new proration program was debated, and it was generally conceded that at best the effect on the markets would be adverse.

Hopeful View Taken

However, it was pointed out that the Texas Railroad Commission had scheduled another hearing April 19, and that Saturday closings could be reinstated after that hearing, if found advisable.

Consequently, it was felt by many that the new allowables would not break the prevailing crude prices, although it was considered certain that various soft spots in the Texas crude market would be aggravated. Such areas where the markets already were soft included the East Texas field, the K-M-A field of North Texas, and several fields in West Texas.

Weak Spots Prevail

If production in Gulf Coast fields is materially reduced under the new program, some market outlet may be diverted to the East Texas field, where a nominal volume of spot oil in tanker lots has been forced to sell on the coast at 4 to 8 cents a barrel below the prevailing fixed charges, such as the field postings, gathering charges, and transportation tariffs.

At K-M-A new wells are encountering some delay in obtaining pipe line connections, and one large buyer is holding to pipe line proration.

The Wasson and Bennett fields and other nearby areas in the north portion of the Permian basin in West Texas have been on pipe line proration since January 20, 1939, due to allowables exceeding pipe line outlets, and naturally more restrictions will be imposed under the new proration schedule. The excess oil is bottled up, however, and no damage to the market can result.

The extra day of production scheduled under the new program is causing pipe line companies to prepare to restore main line booster stations that have been inactive because of small traffic. This is particularly true of West Texas and the East Texas field outlets.

Refined Oil Markets

The refined oil markets had been showing some improvement for about two weeks prior to the announcement of the new Texas proration program, and gasoline tank car prices in the Mid-Continent refining districts had moved upward a little. Following the announcement of the Texas order the market was temporarily marking time, and no appreciable effect was immediately discernible. Apparently, refiners and re-sellers were cautiously awaiting the practical effects of the more liberal crude production allowables.

Revisions for gasoline are chief price changes

Prices in the oil industry were mostly unchanged during the past week, crude postings having remained the same, while revisions of product prices were limited mainly to some further slight improvement in the gasoline market. Tank car prices were advanced ⅛ cent a gallon in some instances in the Chicago market, following similar increases previously in the Oklahoma-Kansas refining districts.

The gasoline market showed some further signs of improvement in the North Texas refining area, and it remained firm in East Texas, following recent advances.

In the retail division, however, the gasoline market has continued to show weakness in various districts. Effective March 22, Socony-Vacuum Oil Company reduced its dealer tank wagon prices for gasoline ½ cent a gallon in and adjacent to New York City.

Gasoline Prices

U. S. motor gasoline ranged in the Oklahoma market last week about as follows: 62 octane and below, 3¾ to 4¼ cents a gallon; 63 to 66 octane 4 to 4¼ cents; 67 to 69 octane, 4¼ to 4⅝ cents; 70 to 72 octane, 4½ to 5 cents.

Corresponding prices in the Chicago market were 3⅜ to 4⅛ cents, 3¾ to 4 cents, 3⅞ to 4⅜ cents and 4⅛ to 4⅞ cents.

In East Texas, 60-62, 400 end point gasoline was priced generally at 4⅛ to 4⅜ cents a gallon.

Natural gasoline, grade 26-70, was priced generally in the Mid-Continent markets, f.o.b. refineries at 2½ to 2⅝ cents a gallon, and sales were repaorted at 2⅜ cents f.o.b. Breckenridge, Texas.

Kerosene prices f.o.b. Oklahoma refineries ranged from 3⅞ to 4¼ cents a gallon for the 41-43 water white grade, and from 4 to 4⅝ cents for the 42-44 water white grade; and corresponding prices in the Chicago market were 3½ to 4⅛ cents and 3⅝ to 4⅜ cents.

Fuel oil prices were mostly unchanged last week. In the Chicago market range oil was priced from 3⅜ to 4 cents a gallon. The No. 1 white oil was priced from 3⅜

Oil in the Courts

Circuit Court will hear appeal motions filed by defendants in Madison anti-trust suit on May 15

The United States Circuit Court of Appeals last week set a hearing for May 15 on appeal motions filed on behalf of 12 major oil companies and 5 oil company officials who were convicted in federal district court at Madison early last year and fined a total of $65,000 by Federal Judge Patrick T. Stone.

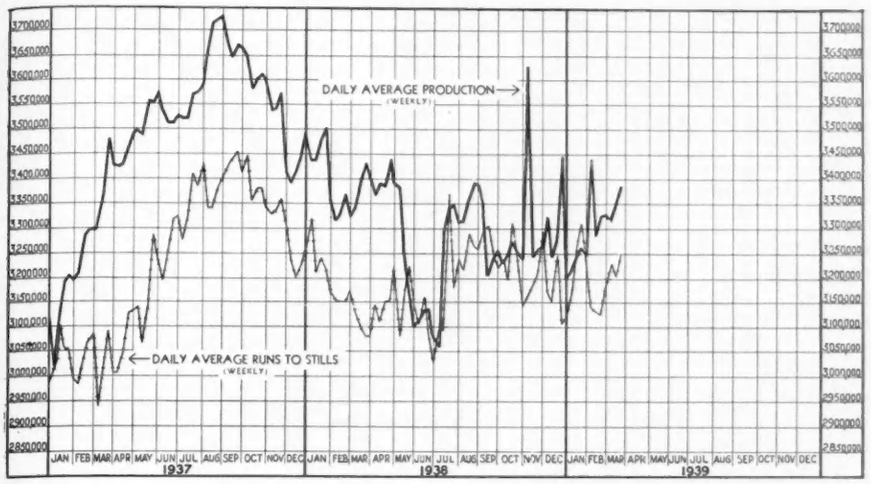
The 17 defendants were among 72 originally brought to trial on charges of conspiracy to violate the anti-trust laws through operation of buying programs in the Mid-Continent and East Texas fields following invalidation of the NRA by the supreme court. Cases of 26 defendants were dismissed before or during trial, and 46 were convicted by a trial jury. Of the latter group, Judge Stone dismissed 11, granted new trials to 18, and fined the 17 who last week filed a 339-page brief with the appeals court in a move to have the fines set aside.

Should the Chicago court, following the May hearing, set aside the convictions and order new trials, the defendants would be tried by Federal Judge Walter C. Lindley along with the 18 corporate and individual defendants who were granted new trials by Judge Stone. The re-trial is scheduled to open in Madison October 2.

Corporate defendants who appealed their fines were: Socony-Vacuum Oil Company, Inc., Continental Oil Company, Shell Petroleum Corporation, Sinclair Refining Company, The Pure Oil Company, Mid-Continent Petroleum Corporation, Phillips Petroleum Company, Skelly Oil Company, Globe Oil & Refining Company of Oklahoma, Globe Oil & Refining Company of Illinois, Empire Oil & Refining Company and Wadhams Oil Company.

Individual defendants were: Charles E. Arnott, New York, vice president, Socony-Vacuum Oil Company; H. T. Ashton, St. Louis, manager of Lubrite Division, Socony-Vacuum Oil Company; P. E. Lakin, St. Louis, general sales manager, Shell Petroleum Corporation; Robert W. McDowell, Tulsa, vice president, Mid-Continent Petroleum Corporation, and R. H. McElroy, Jr., Chicago, tank car sales manager, The Pure Oil Company.

United States Crude Oil Production and Refinery Runs



to 3⅞ cents, and No. 1 straw from 3⅜ to 3⅝ cents. No. 2 straw was 3¼ to 3½ cents. No. 3 oil was 3 to 3¼ cents. No. 5 oils were 57½ to 70 cents a barrel. The No. 6 oil was quoted at 35 to 45 cents.

Production and runs larger than needed

Excessive operations at wells and refineries were reflected in the latest weekly statistics of the oil industry, and the large plant output resulted in a further substantial addition to gasoline storage.

United States crude oil production in the week ended March 18, having averaged 3,384,150 barrels daily, was about 30,000 barrels a day larger than in the previous week and 45,000 barrels a day in excess of indicated market demand, as estimated by the Bureau of Mines.

Crude oil runs to refinery stills averaged 3,250,000 barrels daily in the week ended March 18, having increased 45,000 barrels over the previous week's daily average. The runs were 5.5 percent larger than in the corresponding week last year.

Stocks of finished and unfinished gasoline in the United States increased approximately a million barrels in the week ended March 18, having risen to 87,291,000 barrels. Although that supply was 6.8 percent smaller than the all-time high inventory of 93,192,000 barrels held March 19, 1938, it was larger than economically desirable. For petroleum economists have estimated that about 80,000,000 barrels of gasoline in storage would be sufficient on March 31.

Gas oil and fuel oil stocks were reduced less than 300,000 barrels in the week ended March 18, after having declined considerably greater amounts in earlier weeks. They totaled 130,371,000 barrels on March 18, and at that time were 6.8 percent larger than one year previously. The fuel oil inventories are at reasonable levels, as demand for those oils is considerably better than it was a year ago.

Crude oil stocks decreased 119,000 barrels in the week ended March 11, latest period for which official figures are available, and then stood at 272,852,000 barrels. At that level, they were 10.7 percent lower than a year previously.

Louisiana allowable is higher for April

April oil allowable in Louisiana was set at 257,920 barrels, an increase of 3700 barrels over March, Conservation Commissioner William G. Rankin announced March 24.

South Louisiana was given 193,770 barrels, and North Louisiana, 64,150 barrels. Eola, with 900 barrels allowable daily, appeared in South Louisiana's list for the first time.

The division of North Louisiana's 64,150-barrel allowable follows: Cotton Valley, 8300 barrels, of which 5000 is to Holloway wells and 3300 to Bodcaw (lower Marine) oil wells; Lisbon, 4000 barrels; Rodessa, 28,000 barrels; Shreveport 3850 barrels, an 1150-barrel increase; and others in North Louisiana 20,000 barrels.

Three southern Oklahoma fields get crude price cut

Crude oil price postings for three small fields in Southern Oklahoma were reduced March 20 by Ben Franklin Refining Company, Ardmore, which that date took over gathering systems in the Oscar, Seay and Spring areas from Oklahoma Pipe Line Company. The schedule starts at 60 cents a barrel for oil of gravity between 22 and 22.9, with 2-cent differential up to oil of 34 gravity and above, which is 84 cents a barrel.

For the present runs from leases will be restricted to 5 barrels per well on a lease basis. This restriction has been in effect since August 1, 1938. The statement of I. A. Anson, president, was to the effect that there was hope of removing restrictions with improvements of the refining plant.

Company Makes Statement

Concerning the price reduction his statement read:

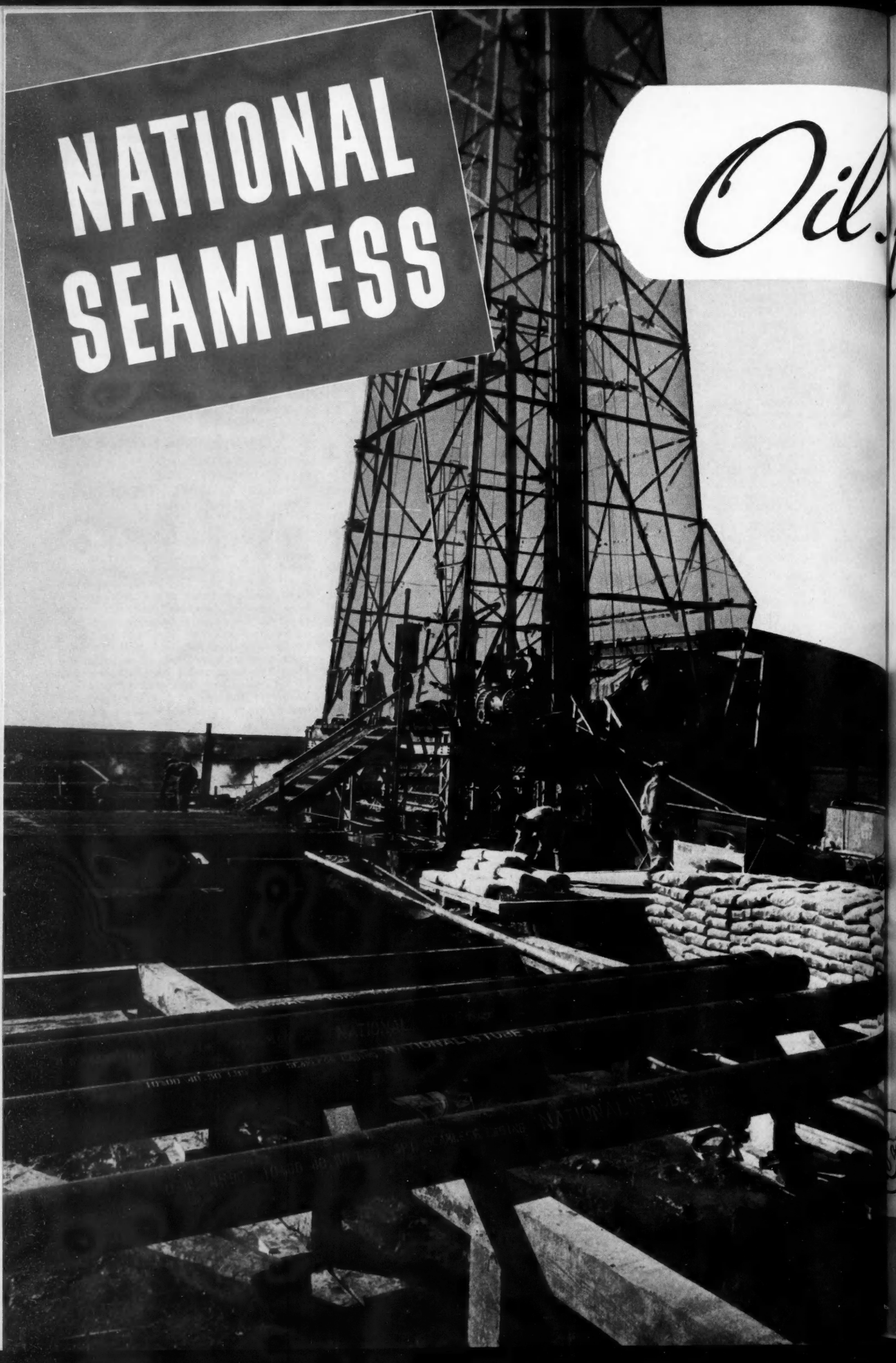
"Present markets for refined oils together with the inferior refining qualities of the oil from these areas required the posting of these prices at this time. Competitive conditions created by the availability elsewhere of equal or superior grades of crude oil at lower prices together with pipe line facilities of crude to strategic refining areas and gasoline to consuming centers necessitates the closest cooperation between the producers and refiners of Southern Oklahoma. We are gratified with the cooperation we have been accorded in the Healdton area and know that we may look to you for your equal cooperation. With the improvement of local demand and a return to normal markets we shall not hesitate to repay your confidence."

Trends of United States Production and Stocks

Figures are from American Petroleum Institute weekly reports, except those on crude stocks, which are from Bureau of Mines weekly reports

WEEK ENDED	Crude Oil Production (Barrels Daily)	Crude Runs to Stills (Barrels Daily)	Crude Oil Stocks (Barrels)	Gasoline Stocks (Barrels)	Gas & Fuel Oil Stocks (Barrels)
September 25, 1937	3,666,300	*3,455,000	307,974,000	65,620,000	116,472,000
March 19, 1938	3,433,550	3,080,000	306,380,000	*93,192,000	122,067,000
March 26	3,405,600	3,080,000	307,557,000	92,858,000	122,979,000
April 30	3,396,150	3,215,000	307,147,000	91,339,000	128,270,000
May 28	3,098,650	3,150,000	301,583,000	87,946,000	134,315,000
June 25	3,083,900	3,025,000	293,463,000	82,412,000	137,801,000
July 30	3,316,400	3,240,000	288,514,000	76,864,000	144,294,000
August 27	3,388,500	3,255,000	285,029,000	71,754,000	146,926,000
September 24	3,251,150	3,220,000	280,278,000	68,605,000	150,468,000
October 1	3,231,800	3,235,000	280,852,000	68,602,000	151,759,000
October 29	3,237,500	3,145,000	275,824,000	67,590,000	153,719,000
November 12	3,243,250	3,180,000	273,394,000	67,551,000	*154,666,000
November 26	3,260,900	3,295,000	270,563,000	68,628,000	153,634,000
December 10	3,245,100	3,150,000	†269,509,000	68,587,000	150,779,000
December 31	3,201,450	3,115,000	273,024,000	71,695,000	144,823,000
January 28, 1939	3,248,250	3,235,000	271,763,000	77,279,000	139,349,000
February 25	3,328,850	3,185,000	271,758,000	84,597,000	133,671,000
March 4	3,314,850	3,230,000	272,971,000	85,379,000	131,930,000
March 11	3,353,000	3,205,000	272,852,000	°86,350,000	130,646,000
March 18, 1939	3,384,150	3,250,000	.....	87,291,000	130,371,000
March 19,1938	3,433,550	3,080,000	‡305,566,000	*93,192,000	122,067,000
Change in past year	—1.4%	+5.5%	—10.7%	—6.8%	+6.8%

* All time peak. † Lowest for 17 years. ‡ Stocks, March 12, 1938. ° Revised.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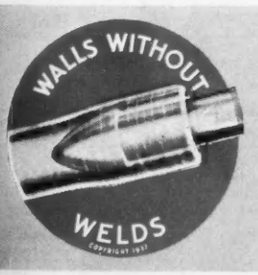

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UNITED STATES STEEL

Crude Production

Decline of 70,275 barrels brings United States daily average down to 3,329,050 barrels for week.

Crude oil production in the United States averaged 3,329,050 barrels daily during the week ended March 25. California and Kansas, leaders in establishing a high for the year the preceding week, reversed roles and declined sharply; putting total production 70,275 barrels daily lower than that for the week prior. Bureau of Mines estimate of demand for domestic crude was 11,950 barrels higher than output.

Texas production dipped to 1,316,150 barrels daily, off 1800 barrels from the preceding week and 2307 and 47,750 barrels less than state allowable and federal estimate, respectively.

California yield was checked at 623,700 barrels daily; 20,800 barrels less than that for the previous week, but still 21,700 barrels higher than state allowable and 35,300 barrels in excess of the bureau forecast.

Oklahoma output advanced to 451,450 barrels daily, an increase of 4975 barrels over the preceding week, 23,450 barrels over the state allowable but 21,750 barrels within the federal recommendation.

Kansas production broke sharply downward to 116,750 barrels. Production at this level was 44,425 barrels less than the previous week, 40,100 barrels less than state allocation, and 33,540 barrels lower than bureau estimate.

Louisiana production at 264,000 barrels was 1275 barrels less than that for the week preceding but 9800 barrels higher than state allowable and 4300 barrels higher than federal forecast.

Small fluctuations were the rule in other producing areas. New Mexico output at 109,350 barrels represented a 100-barrel gain over the week prior. Mountain States production fell 2050 barrels to 68,350 barrels daily. Michigan production was 58,850 barrels, up 1600 barrels from the previous week. Eastern States was 267,250 barrels daily; off 6500 barrels from the week prior.

Osage leases sold

Fifty-six of 79 tracts offered at Osage oil lease sale, Pawhuska, Oklahoma, were purchased at a bonus of $20,255, with Tulsa operators the most active in bidding. Bay Oil Corporation bought in seven tracts and paid the highest bonus of the day, $3200 for a tract west of South Burbank. This area and adjacent tracts developed the hottest bidding of the day. Purchases of tracts showed an increase of 25 percent from the last sale held December 6, last.

1938 peak year for crude production in East Indies

Crude oil production in the Netherlands Indies increased from 1,810,250 metric tons in the third quarter to 1,916,915.7 tons in the fourth quarter of 1938, the latter total comparing with 1,888,025.7 tons in the same period of 1937, according to Edward A. Dow, Jr., of Batavia, Java. All of the oil fields in the country, except those in Java and Ceram, participated in the production increase in the last three months of 1938.

The total output for the year 1938, which amounted to 7,398,585.7 metric tons, was the highest in the history of the industry, although the increase over the 1937 record-breaking production of 7,263,480.6 tons was only 2 percent. The increase in 1938 was almost entirely due to larger production in Djambi, since the other oil fields either showed about the same or a smaller output than last year.

Shreveport.—British-American Oil Company is the latest company reported checking the Rodessa, Cass County, Texas, holdings of R. W. Norton, who has 23 wells with a combined daily allowable of 1160 barrels on 618 acres in that part of the field.

United States Crude Oil Production

Estimates Compiled by The OIL WEEKLY

DISTRICT OR STATE	Bureau of Mines Recommendation (Daily in Mar.)	State Allowable in Mar.	BARRELS DAILY FOR WEEK ENDED Mar. 25	Mar. 18
TEXAS—				
Texas Panhandle			64,100	65,650
North Texas			80,350	80,250
West Central Texas			30,550	30,600
West Texas			209,100	208,250
East Central Texas			94,950	93,500
East Texas Field			371,650	375,250
South Texas			247,250	246,950
Texas Gulf Coast			218,200	217,500
Total Texas	1,363,900	1,318,457†	1,316,150	1,317,950
CALIFORNIA—				
Long Beach			49,900	49,800
Santa Fe Springs			28,600	29,300
Huntington Beach			29,100	30,600
Dominguez			21,300	21,600
Ventura Avenue			33,000	33,200
Midway-Sunset			59,500	63,400
Kettleman Hills			56,400	59,000
Wilmington			84,600	86,100
Others			261,300	271,500
Total California	588,400	602,000*	623,700	644,500
OKLAHOMA—				
Oklahoma City			116,250	117,800
Seminole Area			101,200	95,625
Fitts			30,125	30,150
Others			204,075	202,900
Total Oklahoma	473,200	428,000	451,450	446,475
LOUISIANA—				
North Louisiana			70,550	70,425
South Louisiana			193,450	194,850
Total Louisiana	259,700	254,200	264,000	265,275

DISTRICT OR STATE	Bureau of Mines Recommendation (Daily in Mar.)	State Allowable in Mar.	BARRELS DAILY FOR WEEK ENDED Mar. 25	Mar. 18
KANSAS—				
Burrton-Haven			8,850	8,275
Russell County			24,200	24,275
Silica			11,400	10,450
Others			72,300	117,975
Total Kansas	150,300	156,850	116,750	161,175
NEW MEXICO	109,700	109,700	109,350	109,250
MICHIGAN	47,700		58,850	57,250
ARKANSAS	50,000	53,090	53,200	53,300
MOUNTAIN STATES—				
Wyoming			51,100	52,950
Montana			13,250	13,350
Colorado			4,000	4,100
Total Mountain States	71,300		68,350	70,400
EASTERN STATES—				
Pennsylvania Grade			66,950	71,850
Southern Illinois (New Pools)			164,200	163,000
Illinois-Indiana (Old Pools)			7,050	7,500
Others, Eastern			29,050	31,400
Total Eastern States	225,800		267,250	273,750
Total United States	3,340,000		3,329,050	3,399,325

† Daily average, considering Saturday and Sunday shutdowns.

* Recommendation of Central Committee of California Oil Producers.

WORLD DEVELOPMENT and TECHNOLOGY

Edited by
WM. V. GROSS, Associate Editor

Bolivian Seizure

Farish expects to call for intervention by state department . . . Decision of Bolivian court is scored.

Standard Oil Company of New Jersey expects to renew its request upon the department of state for diplomatic intervention as a result of a recent decision of the supreme court of Bolivia which upheld that government's seizure of holdings of Standard Oil Company of Bolivia, 100 percent subsidiary, according to a statement issued March 20 by W. S. Farish, president of the parent organization.

Farish's statement follows:

"The supreme court of Bolivia on March 8 rendered a decision dismissing the suit of the Standard Oil Company of Bolivia, a 100 percent subsidiary of the Standard Oil Company (New Jersey), filed against the executive decree issued by the military junta of Colonel Toro dated March 13, 1937, which arbitrarily cancelled the company's concession contract of 1922 and confiscated all of its properties in Bolivia. The decision, according to reports, is based on two alleged technical grounds as follows:

Grounds for Decision

"(1) That the transfer of the contract from Richmond Levering Company, Inc., to Standard, did not have the previous approval of the Bolivian government and therefore, the company had no standing in court.

"(2) That the power of attorney from the Standard Oil Company of Bolivia, executed in 1921 by its president, was not accompanied by minutes of the directors' meeting electing him president of the company which the court alleges invalidated the power and left the company's representative without standing in court.

Previously Approved

"Regarding the first point: The official record shows that a petition was filed asking for approval of transfer and such approval was granted by a supreme decree of July 25, 1922, signed by the president and the entire cabinet. The validity of the transfer has been unquestioned by the Bolivian government for the last 17 years and during this time the company spent more than $17,000,000 in the development of the properties.

"With reference to the second point: It is a well established rule in Bolivia that corporate powers of attorney do not require that the minutes reporting election of officers should be set forth therein. The power of attorney of the company's representative has been used in all relations with the government since 1921 and accepted by the supreme court in an action brought before it in 1932. Its validity has never before been questioned.

"Neither of the technicalities on which the decision is based was raised by the defendant in the pleadings which, in itself, under Bolivian law precluded their consideration by the court.

Charges Subterfuge

"The basing of the decision on such trivial points is clearly a subterfuge to defeat the company and to despoil it of its property while avoiding the necessity of ruling on the substantive illegalities of the confiscatory decree.

"The confiscatory decree of March 13, 1937, was based on the alleged ground that the company had failed to pay surface taxes in accordance with the contract and that in 1925 there had been 'clandestine exportation' of 704 tons of crude oil from wells on the Bolivian side for fuel in the drilling of a wildcat well just across the boundary on the Argentine side.

"The facts are that the company's contract provided for increased surface taxes when commercial production began, and a question had arisen in 1928 as to when this would be deemed to occur. By agreement and decree, the date was fixed as January 1, 1930, from which date the higher taxes have been paid, but a subsequent government in 1931 revoked the 1928 decree and claimed that production had begun in 1924. The company appealed to the supreme court against the illegal revocation of the 1928 decree and the unilateral interpretation of the contract, and to this day the supreme court has failed to pass on the substantive issue thus raised.

Where Oil Went

"So far as concerns 'clandestine exportation,' the 704 tons (less than 5000 barrels) were sent over the border in 1925 and 1926 with the full knowledge of the Bolivian authorities, as a gift to the company's Argentine affiliate, remote from centers of distribution, for use as a fuel and not for market. In May, 1936, the company settled the matter by paying an 11 percent royalty on the 704 tons, an amount less than $1000. Following all of this, in November, 1936, the Bolivian government refunded to the company the full amount of a guaranty of 250,000 bolivianos for the performance by the company of its obligations under the contract. The president of the de facto government and all members of his cabinet signed the resolution returning the guaranty fund. No better evidence than this resolution could be adduced to show that the government gave the company a clean bill of health in all respects.

Blames Dictatorship

"The decision is the culminating act of a series by which the Bolivian dictatorship undertook to confiscate the company's property, a process which began within a month after it had acknowledged full compliance by the company with its contract. In December, 1936, the Bolivian junta organized a government petroleum company. Soon thereafter the junta terminated the life of the constitutionally established supreme court and appointed a set of new judges. Then came the confiscatory decree of March 13, 1937, under which the company's properties were seized.

"The confiscatory decree of March 13, 1937, was issued in complete disregard of the terms of the 1922 contract which required a government complaint, six months for compliance and a judicial order establishing the charge. No such procedure was followed. Thereafter, the government, itself a party to the contract and to the litigation in prospect, issued in October, 1937, an executive decree cutting down the statute of limitations from 10 years—some lawyers say 30 years—to 90 days, later extended at the request of the United States department of state to 150 days. This was unprecedented.

"Violent" Propaganda

"To prevent any criticism that the company had failed to exhaust all possible local remedies, the company instituted its suit before the supreme court in March, 1938, although the company advised the state department that justice was not to be expected from the hand-picked supreme court, dominated

by the party leaders and the executive and under pressure of a violent press campaign.

"The company's counsel, Dr. Carlos Calvo, an eminent jurist of wide reputation, was summarily arrested and expelled from Bolivia with nothing but the clothes on his back. An official propaganda campaign was begun which inflamed public opinion throughout the nation and threatened not only the supreme court, warning them of dire consequences if they decided the case in the company's favor, but also any other persons who should view the company's complaint as just. As an example of the extremity reached in pressure on the supreme court, the director general of national police, Maj. Emilio Guzman, in a radio broadcast over the government station in La Paz on February 18, 1939, reported in a local newspaper, El Debate, made the following statement:

Court Threatened

"'It is precisely in these moments that we must make known to the justices of the supreme court our decision to tear out their entrails and burn their blood if, perchance, they rule against the sacred interest of the nation and in favor of the Standard Oil Company.'

"Eight eminent lawyers whose sense of justice prompted them to express opinions criticizing as illegal the acts of the government were subjected to the vilest calumny and personal threats.

"Far more is involved than the value of the properties in Bolivia. If Bolivia can get away with its arbitrary act, it inevitably will lead to the deterioration of the economic and political relations on the American continents.

"The company expects to renew its request upon the department of state for diplomatic intervention, possibly formally, to demand an impartial international arbitration of the question of the legal validity of the cancellation decree of March 13, 1937, and the succeeding denials of justice."

Expect completion of Barco pipe line by end of June

Word from Cucuta, Colombia, indicates informed opinion is that the 12-inch line of South American Gulf Oil Company from the Barco concession to tidewater at Covenas may be completed shortly after the middle of the year, a situation which may mean that production in Colombia will be jumped from 60,000 barrels per day to 120,000 barrels upon completion of the line. Official confirmation of this report has not been obtained, but the same source advises that six wells were completed as high gravity producers on the Petrolea structure of the Barco during January, while one well was completed on the Rio de Oro structure of the same concession.

Exploratory drilling by Colombian Petroleum Company, developer of the concession, continues on Carbonera, another structure located in the Barco.

Colombia's current production of around 60,000 barrels daily comes from the DeMares concession, operated by Tropical Oil Company, an organization which completed seven wells on La Cira structure in January.

Netherlands Pacific will drill two Sumatra tests

Netherlands Pacific Petroleum Company will start two wildcat tests in central Sumatra in April in conjunction with Standard Oil Company of California and The Texas Company.

Approximately 1,482,000 acres are controlled by the companies, which acquired the land in 1936 following a thorough geological study.

Locations for the initial wells are 175 and 245 miles respectively from Medan, one being on the upper Koeboe river and the other between the Siak and Rokan rivers. The territory to be explored borders on the eastern coast of Sumatra and is less than 150 miles north of the equator.

Population of the area is sparse, the most part of the land being swampy. Coolies had to pack in supplies over old elephant trails.

Since construction of a road in 1938 it now is possible to reach the center of the area by motor.

Italy subsidizes A.G.I.P.'s domestic exploration

Italy has authorized the expenditure of 60,000,000 lire (about $3,156,000) in five years as a subsidy to Azienda Generale Italiana Petroli to search for petroleum in Italy, according to the American commercial attache at Rome.

The subsidy, third of its kind, brings the total subsidy to approximately $8,836,800 for the search of petroleum.

Brazil's first producer yielding good grade oil

Added importance is attached to the recent discovery of Lobato field in Brazil upon receipt of analysis of crude from the discovery well. Carlos R. Vegh Garzon of Montevideo, general manager of Administracion Nacional de Combustibles, Alcohol y Portland who visited the well, says the crude breaks down as follows: 20 percent gasoline with 5 percent petroleum ether; 10 percent kerosene; 20 percent Diesel oil; 25 percent lubricants; 20 percent heavy oil and paraffinic grease; 5 percent coke and loss.

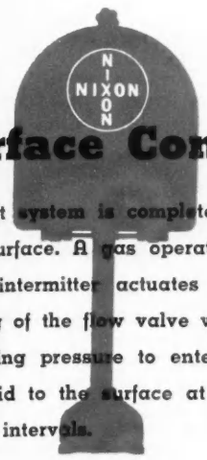
Late in February Lobato 163, the discovery well, was producing 130 liters per day from what has ben classified as "oil impregnated sandstones" at 208 meters, or about 684 feet. Formations drilled through included calcareous rocks, sandstones and shales of the

Showing spot where Brazil's first commercial production of oil has been developed. Modern equipment is being obtained for serious testing of the country's likely petroleum prospects.

Some of the reasons why

NIXON SURFACE CONTROL GAS-LIFT SYSTEM

is so successful!

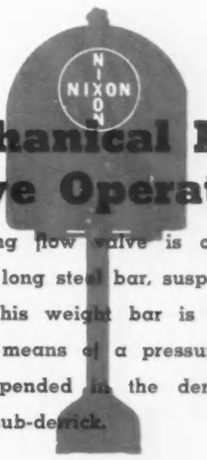


Surface Control

This gas-lift system is completely controlled from the surface. A gas operated and time controlled intermitter actuates the opening and closing of the flow valve which permits well-operating pressure to enter the tubing and lift fluid to the surface at regular pre-determined intervals.

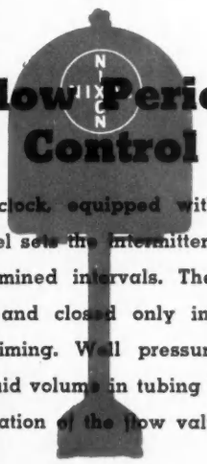
Known Flow Level

One of the series of flow valves is located at the most economical level of production. It is through this valve, and from this level only that the lift originates.



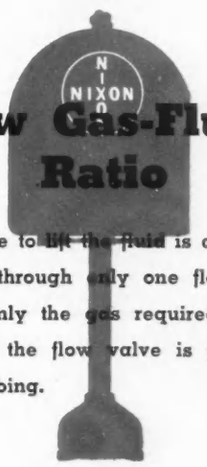
Mechanical Flow Valve Operation

The operating flow valve is opened and closed by a long steel bar, suspended on a wire line. This weight bar is raised and lowered by means of a pressure operated cylinder suspended in the derrick or by means of a sub-derrick.



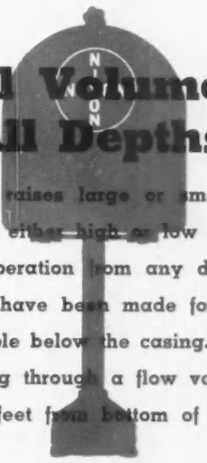
Flow Period Control

A special clock, equipped with a notched timing wheel sets the intermitter in operation at predetermined intervals. The flow valve is opened and closed only in accordance with this timing. Well pressure, operating pressure, fluid volume in tubing has no effect on the operation of the flow valve.



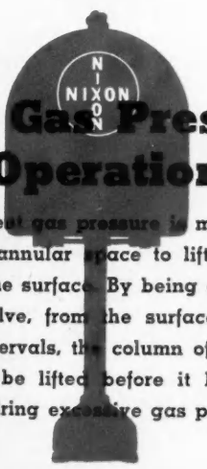
Low Gas-Fluid Ratio

Gas pressure to lift the fluid is admitted into the tubing through only one flow-valve. In this way, only the gas required to lift the fluid above the flow valve is permitted to enter the tubing.



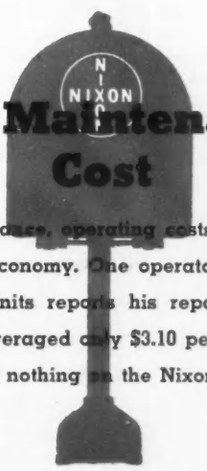
All Volumes All Depths

This system raises large or small volumes of fluid from either high or low fluid levels. It permits operation from any depth. Many installations have been made for producing from open hole below the casing. Still others are producing through a flow valve located only a few feet from bottom of casing.



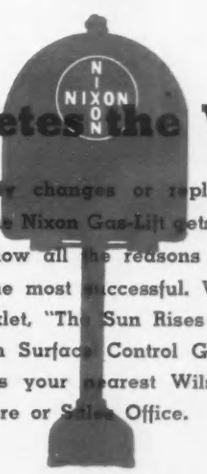
Low Gas Pressure Operation

Only sufficient gas pressure is maintained in the casing annular space to lift the column of fluid to the surface. By being able to open the flow valve, from the surface at pre-determined intervals, the column of fluid in the tubing can be lifted before it becomes too heavy, requiring excessive gas pressure.



Low Maintenance Cost

In every instance, operating costs are setting records for economy. One operator with more than sixty units reports his repair costs for 12 months averaged only $3.10 per unit. There is practically nothing on the Nixon Gas-Lift to wear out.



Depletes the Well

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Carlos R. Vegh Garzon, general manager of Administracion Nacional Combustibles, Alcohol y Portland of Montevideo, Uruguay, and Dr. Glycon de Paiva, geologist for the mineral production bureau of Rio de Janeiro who has played a prominent role in attempts to develop production in Brazil, looking over samples of crude from Lobato 163, discovery well discussed on page 90.

Reconcave Group. Fissures were prominent from 100 meters down.

As previously published in these columns, Dr. Getulio Vargas, president of Brazil, has reserved all land within a radius of 60 kilometers from the well as the property of the state. No concessions will be granted for drilling within this area. Only the government will participate in development of the structure.

Part 2 of a series of articles on the petroleum problems of Brazil, prepared exclusively for THE OIL WEEKLY by Mark C. Malamphy, for five years consulting geophysicist to that government, will appear in an early issue.

Plan additional surveys for British Columbia

Premier T. D. Pattullo of British Columbia announced that additional preliminary surveys will be conducted in the Peace River area, in the northern end of the Canadian province, before the government undertakes actual drilling for oil and gas. The survey work will be in charge of Dr. A. H. Cox, geologist, and Dr. M. Y. Williams, University of British Columbia.

The British Columbia legislature last year voted $60,000 for oil exploration.

Settlement of Mexican oil expropriation stalemated

Despite hopes of the interested parties to the contrary, the week closed without settlement of the controversy existing between the Mexican government and 17 British and American oil companies expropriated by President Lazaro Cardenas on March 18, 1938.

Donald Richberg who acted as representative of the expropriated companies in recent conferences with President Cardenas in efforts to reach some sort of an agreement acceptable to both, left Mexico City March 23 with the comment, "It's a long road between the United States and Mexico." He is reputed to have added, however, that he is now more familiar with that road.

Richberg's reported comment that he is neither discouraged nor encouraged over prospects of a settlement with Mexico for the expropriated properties (variously valued at from $400,000,000 to $450,000,000) is taken in some quarters merely to indicate the appearance of just one more of the several stalemates that have characterized efforts directed at obtaining a practical understanding between the incumbent government in Mexico and private enterprise, regardless of which one of several industries might be involved.

A co-operative plan, outlined this March 18 by President Cardenas, for operating the properties, was not accepted for the companies by Richberg during his stay in Mexico City. Cardenas proposed Mexico would retain control of the properties and "once each of the parties establishes the quantity of respective investment, the percentages of income that each should receive shall be calculated." This was construed by some to infer Mexico would expect additional cash investments on the part of the companies.

Boiled down, the situation is that Mexico still insists the properties will not be returned and the oil companies still insist that they be returned.

Inasmuch as Richberg was scheduled to report to his clients in Washington, speculation is that the state department there will be given an opportunity to decide whether it should actively participate in efforts to effect a settlement with Mexico.

Germany lacks oil despite Roumanian trade agreement

Germany's recently acquired control of the Roumanian oil fields will not entirely solve the problem of petroleum supply from a military viewpoint, it is believed in Washington.

While it is conceded that the five-year agreement between the two countries will materially ease Germany's oil situation, there is some doubt as to just what the situation will be in view of the difficulty of securing adequate statistics.

For the past two years, the trend of oil production in Roumania has been sharply downward, and the 1938 production of 48,841,000 barrels contrasted vividly with the 1936 output of 61,310,000 barrels to which production was building up steadily from 34,758,000 barrels in 1929, due largely to the stimulation of output during those years to provide a greater return to meet increased taxes and other costs. The downward trend of recent production is causing considerable apprehension, the United States Department of Commerce said in a review of the situation March 26, and it is estimated that at the present rate, the known reserves will last only about 12 years.

Twenty percent of Roumania's total production has in the past been exported to Germany. While administration officials in Washington over the week-end have not been advised exactly what effect the German-Roumanian agreement would have on these exports, it is known that some of the Roumanian oil, at least, must go to countries other than Germany under royalty agreements.

[*Continued on page 109*]

WEEK'S DRILLING HIGHLIGHTS

Southwest Texas

Jim Wells County got a new distillate field. The discovery well of Clarke field, near Alice, has changed from a gasser to a distillate producer. Two extension wells were completed at Agua Dulce, Nueces County. West Ranch, Jackson County, got an extension also. Kelsey field, Jim Hogg and Brooks counties, gave impetus to Vicksburg trend development when a well showed for production in that formation. A distillate sand was added to Sun field, Starr County. Pettus district was placed in the list of areas producing from Cook Mountain formation.

North Texas

An offset to the discovery well of Bonita, Montague County, failed to produce commercially from Strawn. A satisfactory completion in the east part of the K-M-A deep area is expected to revive drilling there. A south offset to Asylum's discovery well, Wichita County, filled 4000 feet with oil.

West Texas

Favorable performance of an outpost will lead to development of the gap between Wasson and Bennett fields, Yoakum County. Based on new wildcats, the Ordovician will be the object of exploratory drilling in a number of counties. North Cowden and Johnson pools were extended.

New Mexico

Outposts in two areas will require three offsets each. Completion of the fourth producer at Lovington is pending. The Loco area in Eddy County promises to become an important drilling center.

East Texas

Leon County was promised a new gas distillate area or a four-mile extension of Navarro Crossing. A Henderson County wildcat showed for a commercial pumper.

Oklahoma

Cable tools will be used to deepen a well which opened a new pool this week near Cruse, Stephens County. Hunton lime contributed a producer south of the fault previously defining Fitts. Second Wilcox yielded a 400-barrel well at Brown, an unusual large recovery for that area. A deep, 1320-barrel completion at Fish pool, Seminole County, paves the way for an extensive deepening campaign there.

Kansas

Six extensions assure plenty of available proven locations for weeks to come; Buhler, Campbell, Chase, South Silica, Lanterman and South Letsch were the benefiting pools. Hittle pool of Cowley County also got a minor extension. Two Rice County wildcats loom as pool openers.

Michigan

A field seven miles long is in prospect with a test showing to bridge the two-mile gap between Bloomingdale and Columbia pools in Van Buren County.

North Louisiana

Shreveport has taken the lead in field work for the area, starting 6 operations during the week for a total of 17 active operations, while the fifteenth oil producer was put on production. Cotton Valley's largest producer from the Travis Peak came in for 88½ barrels per hour. In Natchitoches Parish a wildcat has oil in the Paluxy but continued swabbing has not made it flow.

Illinois

Considered the most important of the year in the state is a well in Washington County which swabbed 315 barrels in 24 hours from 21 feet of Benoist sand at 1267 feet. A wildcat in Shelby County is showing for production 3 miles east of the north end of the Beecher City pool.

Indiana

Interest is still high in Gibson County although there still is no outlet for the oil. The fourth good well is in process of completion.

Kentucky

The first McClosky well in McLean County is rated at 200 barrels per day. A Jett sand well in the Birk City area also made 200 barrels to make it the best from that formation in Western Kentucky.

Comparison of Permits Granted for New Wells

STATE	Week Ending Mar. 25	Total this Mo.	Total this Year	Total this Date Last Year	1938 Year Total
Arkansas	1	16	47	57	247
California	19	78	237	312	1,146
Louisiana	8	64	258	312	1,214
Kansas	27	91	288	402	1,453
Michigan	23	92	238	156	953
Oklahoma	42	144	439	491	1,978
Texas	180	888	2,444	3,390	12,369
Total	300	1,373	3,951	5,120	19,360

Summary of Wells Completed in the United States Week Ending March 25, 1939

	Completions	Oil Wells	Gas Wells	Failures	Initial Production	Total 1939	Total this Date 1938
Alabama	....	....	....	....	.....	1	....
Arkansas	2	2	....	....	100	56	49
California	23	18	....	5	19,668	242	266
Colorado	1	....	1	....	.....	6	3
Florida	....	....	....	....	.....	....	....
Illinois	77	70	....	7	20,792	912	186
Indiana	2	....	1	1	.....	27	30
Kansas	20	17	1	2	24,196	284	466
Kentucky	5	1	1	3	30	149	165
Louisiana	17	12	....	5	4,818	224	266
Michigan	19	14	....	5	4,280	270	192
Mississippi	....	....	....	....	.....	1	5
Montana	1	1	....	....	30	24	13
Nebraska	....	....	....	....	.....	....	....
New Mexico	10	9	....	1	6,569	151	121
New York	10*	10*	....	....	71	115*	191*
Ohio	11	3	7	1	73	193	240
Oklahoma	40	27	....	13	7,011	440	531
Pennsylvania	18*	17*	1	....	22	276*	610*
Texas	184	133	6	45	73,094	2,351	3,084
Utah	....	....	....	....	.....	....	....
West Virginia	10	2	8	....	15	123	215
Wyoming	3	2	....	1	500	44	22
Total this week	453	338	26	89	161,723	5,889	6,655
Total last week	418	298	30	90	165,752	5,436	5,421
Total this year	5,889	4,073	403	1,413	.....	....	.....

* Includes water-input wells.

Oklahoma Fields

New pool near Cruse district of Stephens County. Well south of Fitts fault produces from Hunton.

Tulsa.—Oklahoma opened one new pool in the southern sector, drilled in a good Wilcox sand producer in Brown pool in the Nemaha trend in Garfield County, and picked up Hunton lime production south of the fault defining Fitts pool to spotlight activity during the past week.

The new pool for the state is near the Cruse district of east-central Stephens County, producing from shallow sands down to 4000 feet for a number of years. Phillips Petroleum Company made location for the wildcat, Culbertson 1, NW NW SE 4-1n-5w, about 2½ miles east and north of Cruse gas production and about 3 miles west of the Doyle area. The spot was selected on a block of several thousand acres after a seismograph survey disclosed the high.

To Be Deepened

The well was drilled with rotary equipment to 5598 feet into a sand carrying saturation. Casing was spotted at 5580 feet. After drilling plug the hole filled 2500 feet with 40 gravity crude with no water showing. It was reported there was little, if any, gas with the oil. As the pay was not drilled through, the rotary tools are being moved out and the well will be deepened with cable tools.

A Hunton Lime producer south of the fault defining Fitts pool, Pontotoc County, drilled by Patsy Oil Company of Ada, is Bates 1, NW NE SW 26-2n-7e. The test made 156 barrels in 40 minutes, flowing, after treatment with 6000 gallons of acid. At first it was believed that the producer cut the fault between the surface and top of the Hunton, but analysis of past drilling indicates that the subsurface position of the fault at the Hunton contact should be somewhat to the north of the location of Bates 1, indication being based upon two failures drilled to the Hunton, one in the NW NE and another in the SE NE NW of the same section. A line through the two dry holes would pass north of Bates 1. Other producers have been completed south of the fault in what might be either misplaced Hunton section or minor highs roughly paralleling the fault line. Bates 1 is offset by a rig up on the first location west.

Good One at Brown

Brown pool, southeast Garfield County, producing relatively small volumes from second Wilcox sand, came into the picture during the week through Hughes Drilling Company's Meisner 1, CNE NW 10-20n-4w. The test, with a location ½ mile north of production, picked up first Wilcox sand at what was considered too low to make a producer. Second Wilcox sand was topped at 5913 feet and drilled to 5921. Three flows were made by heads during 12 hours, considerable gas sending spray over the top of the derrick. The test is now shut in for erection of tankage and is estimated as being good for not less than 400 barrels daily. No water was encountered in the second pay although the first carried salt water.

Also in Garfield County, where interest is high in the three tests seeking Wilcox production on the west side of past development, Continental Oil Company is drilling below 1600 feet in Luedeman 1, NE SW NE 2-21n-4w. This test and the new producer in Brown pool are on structures controlled by Nemaha Ridge. Brown pool is seven miles south of Garber, midway between the latter and Marshall pool, also a Nemaha Ridge high.

Continental Oil Company's deep wildcat test in Washita County, Proctor 1, CNW 28-10n-20w, is drilling near the 10,600-foot marker with no shows reported. Less than nine hundred more feet of hole are required to set a new depth record for the state.

New Work Indicated

Additional favor was shown the old Fish pool of Seminole County when Cities Service Oil Company's Fish 3, NE SW SE 19-7n-8e, flowed 1320 barrels through a half-inch tubing choke in a 24-hour test. Hole is in dolomite, with bottom at 4142 after topping pay at 4103 feet. The completion of this well paves the way to extensive deepening of old wells now producing from more shallow formations. The high initial volume made by Fish 3 is expected to spur development of the dolomitic reservoir.

In eastern Oklahoma County, Olsen Oil Company et al's White 1, C NE NE 30-11n-1e, a wildcat south of the Newalla district is drilling out of Hunton at 6218 feet after topping the formation at 6002. Good saturation was found in the upper body of the lime with less encouraging shows deeper into the pay.

In Kingfisher County, Gutowskey et al's Lankard 1, NEc SE 34-17n-6w, a wildcat, is drilling Mississippi lime below 7262 feet. South and west of this area a major lease play seems to be forming with tracts being acquired in Kingfisher, Blaine and Canadian counties. Most of the blocking is being directed by the larger operators.

Second Test for Love

The Love County pool opened by Sinclair Prairie Oil Company three years ago is receiving its second test by the same operator. Stockton 2, NEc SW 26-6s-2w, in the pool of the same name, is drilling shale at 4000 feet. The first completion is still producing, although the initial was small, a factor which discouraged active development despite the presence of a large structure.

Oklahoma Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Comanche—		
Wichita Oils, Ashcraft 8, se nec sw 28-2n-10w	*	470
Cotton—		
Turner et al, Collis 6, nw nwc ne 18-4s-10w	*	1288
Creek—		
Wilcox, School Land 1, ne nw sw 16-14n-10e	Abnd.	Lcn.
Lease Inv. Co., Perryman 1, sw ne nw 28-14n-10e	540	3269
Francis O&G, Pinehill 1, se ne se 16-17n-9e	20	2471
Shamblin, Roller 1-A, se ne ne 13-17n-10e	48	1913
Petroleum Drlg. Co., Endicott 1, ne sw ne 13-19n-7e	*	2714
Grady—		
McCasland, Ridley 1, 100 ft e nw ne sw 8-3n-5w	*	2920
Lincoln—		
Mudge, Teters 1, sw se ne 9-14n-6e	75	3115
Cooper, School Land 4, nw se ne 16-14n-6e	350	3125
School Land 7, sw ne ne 16-14n-6e	480	3147
Coralena, Sac & Fox 3, nw ne se 16-14n-6e	115	3055
Wilcox O&G, Sac & Fox 22, ne se se 16-14n-6e	160	3048
Muskogee—		
Metzaer et al, Henry 12, 130 ft n cel nwc sw 1-14n-18e	*	916
Okfuskee—		
Shell, Keyes 2, ne se nw 11-11n-8e	245	3402
Grimes, Alexander 1, se se ne ne 35-11n-9e	5	2944
Stekoll, Holmes 1-A, nw nw se ne 16-11n-11e	18	2680
Okmulgee—		
Pine, Duff 1-A, nw swc se 11-14n-12e	*	2175
Pawnee—		
Renylands et al's Ackley 1A, sw ne se 14-20n-9e	*	2200
Payne—		
Texas Co., Minnich 2, c e½ se ne 11-17n-1e	355	4952
Pontotoc—		
Phillips, Norris 16, sw sw se sw 25-2n-6e (pb 1898 ft)	240	3745
Skelly, Smith 2, se nec 35-2n-6e (pb 1275 ft)	*	3855
Simpson et al, Wooley 4-A, 55 ft w sw ne se 28-2n-7e (pb 4362 ft)	30	4403
Pottawatomie—		
Farmers, School Land 2, swc ne 16-5n-5e (pb 2405 ft)	5	2450
Denver P&R, Troutman 1-A, sw ne nw 1-6n-4e (otd 4091 ft)	85	4140
Cooper, Buely 2, sec nw 36-7n-4e	185	4373
Eagle, Green 1, nwc se 29-7n-5e	329	4093
Cooper, Zoeller 1, ne se se 30-7n-5e	Abnd.	Lcn.
Smith, Tarter 3, nw sw sw 32-7n-5e	720	4055
Portable Drlg. Co., Eddy 1, nwc ne 21-8n-5e	15	4269
Seminole—		
Simpson et al, Eleanor 1-A, ne sec 11-6n-5e	*	2865
Sunray, Swan 1, sw ne se 12-6n-5e (pb 3837 ft)	350	3984
Cities Service, Coker 1, sw se sw 13-7n-6e (pb 4521 ft)	127	4682
Smith et al, Brown 1-A, sec nw 28-7n-6e	*	3372
Hall, Culley 1-A, nwc 11-8n-6e (pb 3950 ft)	*	4204
Gillespie et al, Davis 1, nwc sw 18-8n-7e	*	2344
Ligon, Logan 1, sw nw ne 25-8n-7e	480	3348
Moss, Leachman 1, n½ se ne 34-10n-6e (pb 4264 ft)	2000	4630
Stephens—		
Carter, Warden "D" 3, nw ne se nw 34-1s-5w	12	713
Pace, Houston "B" 10, nw se ne sw 2-2s-8w	15	1560
Tulsa—		
Whitten, Fulson 2, sw swc ne 24-19n-11e	*	1059
Pepis, Bishop 2-A, 130 ft w csl nw se sw 35-19n-12e	7	1368

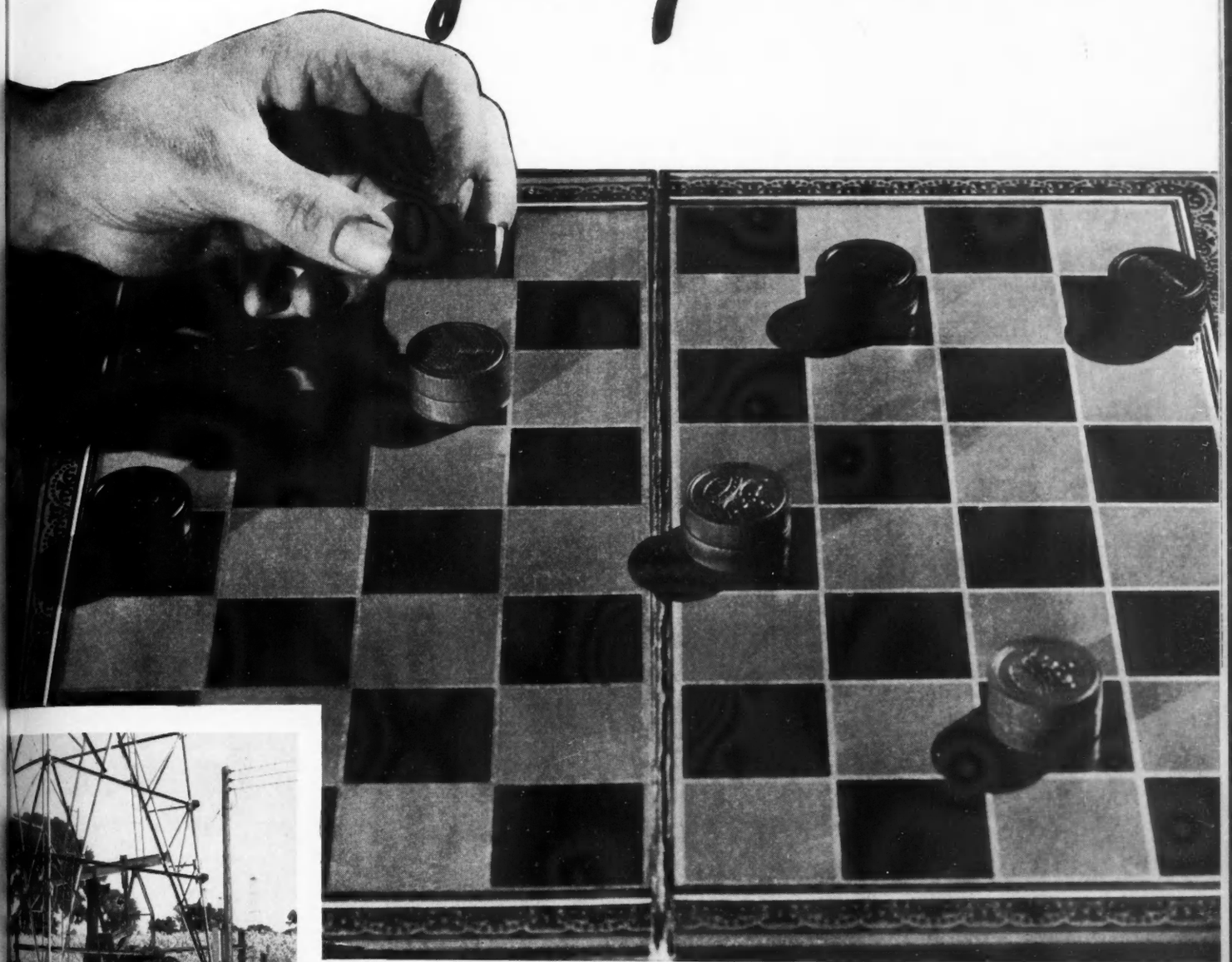
* Failures; † Junked; ¶ Million cu. ft. gas.

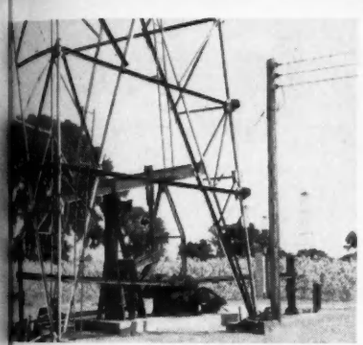
More area in Hazel pool ordered 10-acre spaced

Additional territory of the Hazel pool, Seminole County, was added to the area to be drilled on 10-acre spacing by order of the Oklahoma Corporation Commission March 13. Previously the commission designated N½ 25-7n-5e. The present order enlarges the area to include the NE of 22, S½ of 23, all of 25 and 26, E½ of 27 and all of 35 and 36, in township 7 north, range 5 east. Total acreage is 3040.

The Hazel pool produces from the Earlsboro sand, average depth 2980 feet. Wells are completed for from 50 to 100 barrels initial and settle to around 40 barrels on the pump.

YOU'RE *Jumps* AHEAD





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PROFIT! BY USING Purchased ELECTRIC POWER

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Kansas Field Developments

Six extensions assure considerable new drilling. Two Rice County spots look good for production.

Wichita.—With six pools getting extensions the past week Kansas continues to see active development.

Buhler pool, Reno County, was extended a half mile west with completion of Westgate-Greenland Oil Company's Johns 1, SEc SW 25-22-5w, which was deepened from 3913 feet to 3917 feet in Simpson dolomite. After shooting with 5 quarts the hole filled 2900 feet with oil in 12 hours, earning a potential of 850 barrels daily.

A half-mile extension to the northwest for the Campbell pool, Rice County, resulted as Duwe & Farris' Lucas 1, SE NE NW 33-19-9w, pumped 607 barrels in a 24-hour period from 3230 feet in Arbuckle lime. The same county contributed another good extension in L. A. Farris et al's Purcell 1, SE NE NW 13-19-9w, a mile north of the Chase pool, as it topped the Arbuckle lime at 3198 feet. Upon acidizing with 1000 gallons it pumped at the rate of 25 barrels per hour. Potential is yet to be taken.

A Misener sand showing, Cowley County, failed to materialize as oil was found to be coming from the Arbuckle lime instead, as Arthur Brewer's King 1, NW SW NW 27-31-4e, making 344 barrels daily from the Arbuckle lime bottomed at 3447 feet gave the Hittle pool a quarter-mile extension to the southeast. A wildcat failure in the same county resulted as Phillips Petroleum Company abandoned Esch 1, SEc NE 19-33-6e, 2½ miles southwest of the old Esch gas pool, at 3553 feet, Arbuckle lime. Dead oil with a sulphur odor was noted between 3525 and 3527 feet.

Gulf Oil Corporation's Yeo 1, NWc 30-20-10w, extended the South Silica pool a quarter-mile to the east in Rice County. In 15 hours it pumped 220 barrels from a total depth of 3310 feet in Arbuckle lime.

Barton County received an extension of the Lanterman pool to the southwest as I. W. Murfin's Birzer 1, NEc SW 21-19-11w, swabbed 60 and 30 barrels in two 12-hour periods. It topped the Lansing at 3060 feet, with first oil encountered between 3130 and 3136 feet and a second show of oil between 3152 and 3154 feet. Seven-inch casing was landed at 3144 feet as oil rose in the hole to 2900 feet. The Kansas City-Lansing was acidized with 4900 gallons to a total depth of 3154 feet, after which it was swabbed. A potential test will be made.

South Letsch, Russell County, was extended three-quarters of a mile to the northwest as Skelly Oil Company's Carter 1, CSL SW NE 33-14-13w, topped the Kansas City lime at 2825 feet and drilled to 2862 feet. At a total depth of 2869½ feet in Oolitic lime it swabbed 15 barrels in two hours. It is to be acidized for final potential.

Two Likely Spots

Two spots in Rice County likely to prove productive are now testing. W. E. Rennie's Williams 1, C S½ SE SW 27-21-9w, southeast of the Thurber gas pool, had a show of oil and water in the Misener sand between 3438 and 3461 feet. Casing was set at 3438 feet and drilling is to continue to the Arbuckle lime. I. W. Murfin and others' Habiger 1, SWc 6-18-9w, east of Stumps pool, found water in the Arbuckle lime and was plugging back to test the Kansas City-Lansing group at 3270 feet.

Shawnee County in the Forest City Basin area was active with two locations staked and another at an interesting stage. Guy Scott's Malone 1, SE SW 10-12-17e and McKnabb's Spurgeon 1, SE SW SE 28-10-15e, were staked as locations. The latter is 36 miles northwest of the Baldwin City pool, and on edge of the Forest City Basin. W. M. McKnabb's Fritz 1, SW SE NW 4-12-14e, southwest of Topeka, was below 2160 feet, and information as to shows was withheld.

An interesting wildcat in Kiowa County is under way as Sinclair Prairie Oil Company digs pits for Price 1, NWc SE 22-28-20w, 6½ miles southeast of this company's Ford County gas discovery, Young 1, which was shut in last year while making 4 million cubic feet of gas with a show of oil from Mississippi lime. Morrison pool, Clark County, is the nearest commercial oil production. It is 24 miles to the southwest thereof.

Good Pool Indicated

Development continues to forecast a nice producing area in the Prusa pool, Barton County. To date six wells have been completed, one stands with 2000 feet of oil in the hole while two are drilling. The discovery well was completed by Sinclair Prairie Oil Company, being Mary Prusa 1, NWc SE 20-16-11w, for pumping potential of 1313 barrels between 3335 and 3352 feet in the Arbuckle lime. The area was worked out geophysically and found to consist of a series of small highs superimposed upon a larger structure. By drilling these highs it has been found that the Arbuckle lime is absent at the structural crest due to truncation but is present on the flanks where it is productive. In the absence of Arbuckle lime the Pre-Cambrian is immediately encountered being non-productive. As considerable gas was found on the crest of the Kansas City-Lansing group, oil should be expected lower down the structure where the Arbuckle is also found productive. A gasser just completed, Sinclair Prairie Oil Company's Oeser 1, SEc SW 17-16-11w, made 30 million cubic feet between 3131 and 3142 feet in the Kansas City-Lansing.

Other completions in the pool, all by Sinclair Prairie Oil Company are: Joe Prusa 1, C SL NE 20-16-11w, initially producing 1252 barrels from the Arbuckle lime; Seyfert 1, SW NEc 21-16-11w, making 2110 barrels from Arbuckle lime; Seyfert 2, NE SWc 21-16-11w, completed for 110 barrels daily from 3352 feet after acidizing the lime; Martha Laudick 1, NWc 21-16-11w, pumping 294 barrels from the Arbuckle lime topped at 3298 feet, after acidizing with 2000 gallons, and Mary Prusa 2, 110 feet south of C WL NW NE SE 20-16-11w, which made 2000 feet of oil into the hole in 5 hours.

Two wells now drilling are Henry Laudick 1, SW NW NE 21-16-11w, and Redetzke 1, SWc 16-16-11w. Three or possibly four more wells will be staked upon completion of the two now drilling.

Dry holes to the north and east of Prusa pool tend to discourage drilling in those directions. The nearest dry hole to production is the company's Frederick 1, SWc SE 16-16-11w, one quarter mile north of the Henry Laudick and one half mile east of Redetzke 1. Continental Oil Company and Sinclair Prairie Oil Company's Pincher 1, NE SEc NW 23-16-11w, was abandoned at 3427 feet in Arbuckle lime, 1½ miles east of nearest production.

Kansas Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Barton—		
Sinclair-Prairie, Marth Laudick 1, nwc 21-16s-11w	294	3305
Cities Service, Bitter "C" 3, csl sw nw ne 18-16s-13w	*	3397
Continental, Underwood 2, nw ne ne 10-17s-13w	583	3353
Stanolind, Panning 15, cwl sw ne se 2-20s-11w	1273	3269
Panning 18, c n½ nw 11-20s-11w	1931	3282
Butler—		
Cromwell et al, Stearns 7, nw ne ne 33-27s-6e	10	3071
Cowley—		
Phillips, Esch 1, sec ne 19-33s-6e	*	3552
Ellis—		
Kerlyn, Rumsey 7, ne se sw 23-11s-17w	3500	3446
Ellsworth—		
Continental et al, Fuller 2, 100 ft n cwl sw se se 28-17s-8w	2233	3230
Kuhnle 1, nec sw 28-17s-8w	729	3263
McPherson—		
Continental, Kindblade 6, csl sw ne sw 20-21s-1w	229	3328
Pratt—		
Shell, Lemon 1, sw sw ne se 13-28s-12w	¶1.5	4339
Rice—		
Continental, Siemsen "A" 1, nw ne se 13-18s-8w	2613	3224
McPherson Drlg. Co., Cramm 1, se c nw 15-19s-9w	761	3208
Carlock et al, Johnson 1, csl se nw se 31-20s-7w	1698	3321
Russell—		
Shields, Rogg 2, sw nw sw 28-14s-13w	1005	2938
Continental, Meharg 3, nec 17-15s-13w	1549	3096
Cities Service, Redetzke 1, nec 21-15s-13w	749	3093
Stafford—		
Moore, N. W. Johnson 3, sw ne ne 13-24s-11w	1196	3786
Continental, Maggie Russell 1, ne swc ne 13-25s-13w	2843	4075

* Failures; † Junked; ¶ Million cu. ft. gas.

New locations ahead of Kansas completions

Wichita.—Results for the seven day period show 17 oil wells completed for a total initial output of 24,196 barrels. One gas well was completed for an open-flow of 1.5 million cubic feet. Only two starts resulted in failures. Twenty-seven wells were staked during the week. Rice County leading with 8, being followed by Russell with 6, Barton, Cowley and Stafford 2, Barber, Butler, Ellis, Kiowa, Rooks, Shawnee and Sumner 1 each.

Illinois Developments

Second Washington County completion swabs 315 barrels
Old Effingham County hole may be carried to 7000 feet.

Oleny, Ill.—Pres Cochrane and G. H. Blankenship's Oak Grove Cemetery 1 (Pres Cochrane's Blankenship 1), SE SE SW 15-3s-3w, Pilot Knob Township, Washington County, swabbed 315 barrels during 24 hours after drilling 21 feet of saturated Benoist sand, topped at 1267 feet.

Illinois Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Clay County—		
Pure, G. L. Travis 4B	232	3037
Phillip Edens 2	360	3090
Schafly & Dameron, Nash 4	45	2976
Clinton County—		
Shell, Allison 12	48	1375
Adams O&G Co., Copple 10	50	1369
Coles County—		
Wheeles & Whisenant, Michael 1	18	1919
Fayette County—		
Palacine Oil Co., Mueller 1	*	1460
W. C. McBride, Inc., Logue 5	500	1528
Sol Simon et al, Owens 2	400	1534
Sigel et al, Owens 2	350	1529
Union Products Oil Co., Arnold 3	154	1574
Central States, Louis McKenzie 3	124	1590
Williams et al, Smith 7	100	1573
Shell, C. F. Fulton 5	67	1576
Stewart Oil Co., Griffith 2	175	1557
Griffith 3	400	1580
Texas Co., O. Buff 1	125	1574
George Parker, Mary Lange 1	*	1903
E. F. Jones, Clara McCan 1	*	1582
Carter, John Durbin 1	35	1525
Mary Hoar 2	18	1558
Lewis Hackert 1	616	1586
M. J. Griffith 2	432	1591
M. J. Griffith 3	364	1570
Mary Smith 1	465	1507
Rosa Sealock 1	332	1594
C. C. Bennett 1	500	1550
Robert Fair 3	120	1568
Robert Fair 4	192	1533
Emily Sherman 1	48	1505
Emily Sherman 2	30	1563
Roy Weber 1	498	1562
Anna B. Tucker 1	132	1569
Anna B. Tucker 2	108	1536
Anna B. Tucker 3	84	1563
Fred L. Brown 3	68	1550
William Ireland 1	252	1583
La Verne Deal 1	400	1447
Irvin Hobbs 5	172	1575
George Pasley 1	488	1486
Jefferson County—		
Keenan-Coe, Kobezeski 1	*	2276
Marion County—		
Mammoth P&R Co., Bachman 8	10	2125
Haynes & Thomas, F. Lee 1	960	1813
Joe Slivka & Frazier, F. Lee 1	740	1834
Texas Co., M. Bryant 4	210	1874
W. Friedrich 3B	115	1854
W. Friedrich 4B	490	2061
W. Friedrich 5B	580	2064
City of Centralia 8	581	2075
City of Centralia 14	322	1832
N. Shanafelt 1	12	1870
J. Chapman 7	280	1828
J. Chapman 8	378	1823
F. Lee 4	140	1808
W. Sands 1	826	1830
W. Carr 4	560	1993
G. Johnson 5	231	1772
Shell, Young Heirs 4	978	1797
Young Heirs 6	648	1800
Magnolia, D. A. Shanafelt 14	312	1863
W. O. Chitwood 22	240	1816
W. O. Chitwood 23	480	1808
Ohio, C. E. Loyd 2	94	1852
C. E. Loyd 3	120	1818
C. E. Loyd 4	150	1821
C. E. Loyd 5	152	1812
W. C. McBride, Inc., N. L. Lee 1	300	1842
N. L. Lee 4	476	1744
Tide Water Associated, Miller 4	240	1896
Menhall, I. C. R. R. 1A	*	3021
F. D. Strickler, Holsapple 1	*	2168
Montgomery County—		
Erie Drilling Co., Schroeder 1	*	823
Richland County—		
Pure, Howard Cazel 3	98	2597
St. Clair County—		
O'Meara et al, Tarlton 2	90	540
Wayne County—		
Pure, Brown Consolidated 2	164	3165
Effie Brown 1	212	3141
G. A. Manahan, Elmer Fitch 1	1200	3112

* Failures; † Junked; ¶ Million cu. ft. gas.

The well, second producer to be completed in the southwestern county, is considered the year's most important development. It is 1¼ miles southwest of G. H. Blankenship's J. L. Dennis 1, completed shortly after the turn of the year for an initial pumping production of 25 barrels daily. Tubing was being run and a pump installed at the new well.

McBride, Inc., began work immediately on the first of five tests to be undertaken immediately in the vicinity, while offsets will be required by both Shell Petroleum Corporation and Magnolia Petroleum Company. Slush pits were being dug for an offset on an abandoned roadway held by Blankenship. Contract has been let for a 3½-mile pipe line to connect the well with the M. & I. railroad at Oakdale.

Kingwood Oil Company was reported preparing to re-enter McWhorter 1, C E SE NW 15-6n-6e, Union Township, southern Effingham County, which was abandoned last June at 5823 feet, in the Middle Ordovician, as the deepest hole drilled in Illinois. The company is said to be considering deepening to 7000 feet.

Texas Buys Acreage

In four deals completed during the week, The Texas Company acquired small pieces of acreage in the Lake Centralia-Salem pool for cash considerations totaling more than $1,000,000. Largest transaction reported at $426,000 and other considerations, was the 40-acre English lease in Section 8-1n-2e, on which four Benoist and two McClosky producing wells have been drilled. No. 7 was being drilled below 2900 feet for a test of the Devonian, but will be temporarily shut down. N. H. Beard, in whose name the English lease was purchased, confirmed reports that several oil showings had been encountered in No. 7 below the McClosky depth, confirming rumors that had been current for several weeks.

In other transactions, The Texas Company obtained the Pittenger 3-acre tract from Robert Brothers for $300,000, the Anna McLaughlin ½-acre lease from J. J. Broadus et al for $106,000, and scattered holdings of Eddie Self for $250,000 and other considerations.

In White County, Price & Massey's Sam J. Higginson 1, wildcat in NW NW NE 22-4s-10e, Phillips Township, was drilling below 2600 feet. At an elevation of 425 feet, the test topped the West Franklin series at 625 feet, Providence series at 690 feet, Mannsfield or Pottsville at 1470 feet, Chester at 1945 feet, Degonia at 2097 feet, Cloe at 2138 feet, Palestine at 2230 feet, Menard at 2295 feet, Waltersburg at 2370 feet, Vienna at 2436 feet, Tar Springs at 2440 feet, Glen Dean at 2500 feet and Hardinsburg at 2537 feet.

Material for a White County Devonian test was being moved in by Gene Shirley on the Eastwood farm, SE SE 29-3s-11e, Gray Township, about 1 mile south of Grayville. Sommers and Eagan are the drilling contractors. In this county, Shirley & Priest's Matilda Hohn 1, wildcat in NE NW SE 32-3s-14w, Gray Township, was drilling at 1300 feet. It is 2½ miles south of Grayville.

A new Wabash County wildcat location is W. N. Bartlett's C. Stansfield 1, SW SE SE 19-2s-13w. Bickford & Crum are the contractors. Meanwhile, Tide Water Associated Oil Company's E. Cowling 1, SW SW SE 18-2s-13w, Keensburg Township, was drilling at 1500 feet.

Shelby County Well Showing

Fayette County operators were watching J. A. Ayleward's Wabash R. R. 1, wildcat in the C N NE 27-10n-5e, Prairie Township, Shelby County, which was cleaning out after a 15-quart shot of nitro in the Benoist, topped at 1937 feet. A reported 11 feet of saturation was found in the sand. Eight miles north and 3 miles east of the north end of the Beecher City pool, it would open that gap for exploration if successfully completed. The wildcat is 2 miles north of Stewardson and 19 miles southwest of Mattoon.

Mammoth Oil & Producing Company's Heitz-Ridenour 1, Section 34-4n-9e, an attempted 1½-mile southwest extension to the Cypress sand pool of Richland County, had surface pipe set. It is between the sand pool, now a double-pay pool with recent completion of several wells in the McClosky lime, and the old north Noble Township pool, one of the best McClosky areas of the state.

About ¼-mile south of Kingwood Oil Company and Gulf Oil Corporation's Burge 1, south outpost of the Lake Centralia-Salem pool and first Devonian test in the area, which was abandoned at 3658 feet a week ago, Longoria Brothers et al's Hess 1, NW NE 29-1n-2e, set surface pipe last week. It may be carried to the Devonian.

Delta Drilling Company's Stenson 1, SE SE SW 9-9s-9e, Gold Hill Township, cored a dry Tar Springs, topped at 1964 feet, and

Ohio Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Holmes County—		
Lydic Oil & Gas Co., Straits 2	¶	785
Knox County—		
Ridgeway Co., Simmons 1	¶.26	2757
Lawrence County—		
Ohio Fuel Gas Co., Gardiner 1	¶.15	3022
Licking County—		
Hope Const. & Ref. Co., Ashcraft 1	22	2831
Lorain County—		
Cain, Zolka 1	50	2195
Dillon & McFrederick, Moore 1	¶.30	2681
Meigs County—		
Nelson, Might 1	*	744
Muskingum County—		
Pure, Eppley (Baughman) 2	¶9.50	3995
Noble County—		
Ward, Williams 1	¶	1367
Tuscarawas County—		
Brendel Prod. Co., Marsh Lumber Co. 2	¶.12	4825
Washington County—		
Anderson et al, Sam 1	1	1355

West Virginia Completions

Boone County—		
Nelson Gas Co., Pauley 1	¶.15	2111
Calhoun County—		
Adams Heirs, Wilmoth Heirs 1	¶.20	2244
Gilmer County—		
L. E. and W. H. Mossor, Riddle 1	¶1.00	2108
Kanawha County—		
United Fuel Gas Co., Wines et al 4812	¶11.68	4975
Lincoln County—		
Adkins, Collins 1	¶.16	2279
Marshall County—		
Patterson, Patterson 1	5	3201
Mingo County—		
W. E. Burchett, Meade 1	¶.10	3801
Ritchie County—		
Corey, Kelley 1	¶.05	2091
Roane County—		
Peoples National Bank, Ball 1	10	1805
Wetzel County—		
Big Four Oil & Gas Co., Herrick 2	¶.11	544

* Failures; † Junked; ¶ Million cu. ft. gas.

found a water sand directly below. The wildcat was deepening to the McClosky.

In Madison County, Louis C. Simmel's Mary Keeler 1, NE NE SE 7-3n-8w, Collinsville Township, recovered tools which were lost while plugs were drilled to 8 feet of Niagaran lime saturation, topped at 1281 feet, but it was found that casing had been set below the top of the formation. Operators decided to deepen, and at last report were drilling at 1355 feet.

Kingwood Oil Company and Continental Oil Company's Van Dyke 1, SE SE SW 11-5n-6e, Blair Township, Clay County, drilled through a dry St. Louis lime and was abandoned at 3080 feet. Also dry was Kingwood Oil Company's Casey 1, NW NW NW 27-6n-4e, Effingham County, abandoned at 2468 feet.

A Jasper County wildcat, Kingwood Oil Company and Bur-Kan Petroleum Company's J. Harrison 1, SW SW 2-7n-10e, 2 miles west and 1 mile north of Hunt City, encountered a show of oil in the Casey sand at 615 feet and was drilling ahead below 1900 feet. O. C. Borah et al's Whelan 1, wildcat in the NW SW SW 24-8n-9e, Crooked Creek Township, was abandoned at 2750 feet after passing through a dry McClosky, topped at 2635 feet.

Illinois issues new geological map

The Illinois State Geological Survey at Urbana last week announced publication of an isopach map of the Chester series below the Pennsylvanian system, done on a scale of about 8 miles to the inch and contour interval 100 feet.

The strata were uplifted, folded and eroded in the post-Chester-pre-Pennsylvanian interval and the isopach lines show regional structural trends and some local uplifts developed during this interval.

Indiana Fields

Gibson County continues hot spot with no outlet

Evansville, Ind.—Gibson County continues Indiana's hot spot, although completed wells are shut in for lack of transportation facilities.

Earl Hollandsworth & Joe Bander's (Hollandsworth & Bander Drilling Company's) David M. Cooper Estate 2, NE SW 13-3s-14w, indicated the fourth large well in the recently opened Wabash Township McClosky pool. Casing was set and cemented to the top of the formation, encountered only 5 feet lower than at No. 1, a location to the west. Operators were in no hurry to complete.

H. B. "Hap" Houseman, who had a part in drilling the discovery on the Cooper Estates, announced two locations, both on the Cooper lease. One is in C N NE NW 13-3s-14w, and the other in SE NW 13-3s-14w.

L. H. Choate, of Midland, Texas, announced location for Coleman 1, Section 3-2s-11w, a mile west of Princeton, Gibson County. Drilling contractors are Luke Simms and Jack Fields. C. M. Lane has turned over a deal for a test on the Vergil McCarthy farm, NE NW 13-2s-11w, Patoka Township, to Longhorn Oil Corporation.

Allender, Witt, Douglas et al's (A. Grewe & August Kruse's) Pauline Scherer 1, NW NW SW 13-7s-13w, Black Township, Posey County, were preparing to core for the Waltersburg sand at about 1700 feet.

In the Heusler Dome pool of Posey County, Sun Oil Company's Mann 4, SW NE SW 1-7s-12w, which was dry in the Waltersburg sand from where other wells in this pool are producing, was being deepened to the Tar Springs. This company was moving in materials for Dietz 4, in this pool.

Frank Damron et al's Audrey W. Haines 1, NW NE SE 34-7n-6w, Ohio Township, Spencer County, found some oil saturation in the McClosky but was having salt water trouble after plugs were drilled.

Indiana Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Pike County—		
Holland's Bank of Evansville 7	¶	630
Vanderburg County—		
John Baumgart, Baker 1	*	1300

* Failures; † Junked; ¶ Million cu. ft. gas.

Kentucky Fields

McLean County McClosky well rated 200 barrels day

Owensboro, Ky.—J. C. Ellis' Steven Heirs 1, about 1 mile southwest of Livermore, was completed as McLean County's first McClosky lime producer last week. On natural flow it filled a 100-barrel tank within a few hours and was rated as a 200-barrel producer. Bottom is at 1640 feet. The strike has brought a flurry of lease and royalty buying in the vicinity.

Major Oil Company's Wahl 5, on the Daviess County side of the Birk City pool, was completed as one of the largest Jett sand wells in Western Kentucky. Completed at 1250 feet, it is a 200-barrel pumper. The company's Wahl 4 was completed at 1870 feet with McClosky lime pumping production of 300 barrels daily.

This company is preparing to acidize West Heirs 1 for the second time. The well was declared dry last February 10 when acid failed to loosen oil in the McClosky at 1871 feet, but flood waters delayed abandoning the test. When flood waters receded, oil was found standing in the hole. After a second treatment this week, the well is expected to be good for 200 barrels a day on the pump.

Flood waters are still retarding operations in several sections of Western Kentucky.

W. P. Hildebrande et al's Leni Leoti Taylor 1, 3 miles south of Lewisport, Hancock County, was started last week. It will be a McClosky test carried down with cable tools. Another new McClosky start is Albert Brauer and C. H. Daniels' W. H. Pollard 1, 3 miles west of Uniontown, Union County. It will be drilled by Hume & Huff, contractors, with a rotary outfit.

Sun Oil Company and Kentucky Natural Gas Company's George Trigg 1, 800 feet southwest of the new Croydon pool opener of Henderson County, was started last week and at last report was drilling below 1000 feet. Destination is the McClosky lime at about 2600 feet, which operators hoped to reach early this week.

In Ohio County, W. E. Neal et al's Mrs. J. C. Nabors 1, adjoining the Dundee pool, completed a fishing job and was continuing to the Jett sand.

Near Belton, Muhlenberg County, Fred Phillips' Shearn Coal Company 2, offsetting this operator's pool opener on this tract, was drilling at 1460 feet, while the No. 3 operation was drilling at 420 feet.

Kentucky Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Daviess County—		
Pyramid Oil Co., Litsey 3	*	1950
Smith et al, Craven Hrs. 1	30	1355
Hildt et al, Moore 1	*	1650
Hancock County—		
Tracy Supply Co., Smith 2	*	....
McLean County—		
Ellis, Stephens Hrs. 2	¶60	1200

* Failures; † Junked; ¶ Million cu. ft. gas.

Iowa to require notice to drill

The Iowa State Senate, without a dissenting vote, last week passed a bill requiring notice of intention to drill for oil or gas to be filed with the state geologist prior to five days before commencement of operations. The bill would also require offsets where adjoining land is within 330 feet of a producing well to be drilled within 90 days, and provides for recording of forfeited leases to prevent clouding of real estate title.

The bill, which is one of several in the Iowa Legislature prompted by leasing activity in the Forest City Basin, has been sent to the House for concurrence or rejection.

New York Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Allegany County—		
Bradley & Streeter, South Penn Oil Co., farm, Genesee	4	1352
Cam Oil Co., Colegrove farm, Genesee	2	1345
Genesee Oil Co., farm, Genesee	3	1320
Cleveland Oil Co., Clemens farm, Clarksville	4	1348
R. B. Moore et al, Curtiss farm, Bolivar	3	1290
Forest Oil Co., Ackerman farm, Bolivar	50	1378
Bradley Prod. Corp., Star farm, Bolivar	5	1390
Allegany: Water Intake Wells		
Chenunda Creek Oil Co., Richmond farm, Willing	...	1030
Bliven Hill Oil Co., Norton-Ockerman farms, Scio	...	965
Norton-Ockerman farms, Scio	...	987

Pennsylvania Completions

BRADFORD DISTRICT

Lloyd & Hardy, Meehan	1	....
J. H. Brahaney, Fee	2	....
Penn Valley Crude Oil Corp., Redfield	5	....
Forest Oil Corp.	1	....
Niagara Oil Corp., 2 wells	2	....
Bradford Transit Co., 7 wells	7	....
Bradford: Water Intake Wells		
Niagara Oil Corp., 2 wells	...	....
Forest Oil Corp.	...	....
Butler-Armstrong District		
W. H. Miller & Co., W. H. Miller	3	....
Middle District		
S. M. Beighlea, G. W. Berringer	1	....
New York-Pennsylvania Gas Field		
New York State Natural Gas Co., N. E. Truax	¶	....

* Failures; † Junked; ¶ Million cu. ft. gas.

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West Texas Fields

Gap between Wasson and Bennett to be developed. Three tests start for Ordovician near Sand Hills.

Midland, Texas.—Exploration of the 3-mile interval that separates the Wasson and Bennett fields, Yoakum County, will proceed shortly as result of the favorable showing made by Texas Pacific Coal & Oil Company's Brownfield 1, SEc NE¼ Section 802. It extended the Wasson field 1¼ miles and along a trend towards the Bennett area in flowing 239 barrels of oil in 6 hours after 600-quart nitro shot at 5000-5151 feet. Standard rig front has been moved in to clean out cavings before making a proration gauge. Orders to deepen this well 18 feet before shooting were cancelled rather than to risk bottom hole water.

Recent lease options taken on acreage between the two fields were being paid off the past week. Deals involving development rights on acreage held by the Santa Fe Railroad, W. N. Willard, trustee, call for continuous drilling after the completion of the first well, but extensions are allowed when no pipe line connections are available.

Osage Oil Company's N. O. Miller 1, C NE NE Section 898, 2310 feet west of production in the west portion of the Wasson field, failed to fulfill expectations in flowing 145 barrels of 32.4 gravity oil and 41 barrels of acid water in 24 hours. Broken pay at 4933-5106 feet was treated by stages with 10,500 gallons of acid. It is bottomed at the same structural level as the nearest producer.

Shell Petroleum Corporation's Waples-Platter 1, 3-mile northeast outpost for the Bennett field, was drilling at 5050 feet, having changed to cable tools at 5000 feet.

The prolific lower pay found by two previously deepened wells in the Seminole field, Gaines County, is being sought by Shell Petroleum Corporation's M. J. Mann 1, east offset to the discovery. The well was completed last June rated at 568 barrels initial after using acid in broken lime at 5027-60 feet. The flow increased to 1100 barrels 34 gravity oil, with 3,000,000 feet of gas daily, when deepened to 5174 feet, or 1826 feet sub-sea. It has since been killed to take in more pay. The area is without a pipe line outlet, and the production must be marketed in tank trucks at the expense of the producer. When a pipe line connection is available a substantial development program will follow, as the 12 flowing wells proved up a big area and large well potentials are possible in the south end of the field.

Exploration of the Ordovician series in the lower Permian Basin is destined to figure in West Texas developments for some months hence. Three tests are active near Ordovician production in the Sand Hills field, Crane County, and a test is drilling in the nearby McKnight pool. Schleicher and Sutton counties have a group of prospects underway.

Anderson-Prichard Oil Corporation et al's Masterson 1, C S½ of N½ H&GN Section 104, Block 10, Masterson shallow pool, Pecos County, drilling at 1200 feet, with an elevation of 2425 feet, is given the highest rating among the deep Ordovician wildcats, based upon the supporting geology and geophysics. All available leases and royalty interests in the area have been withdrawn from the market. George T. Abell, Magnolia Petroleum Company et al are to start a second Ordovician test on their Imperial block prior to July 1, 1939. Location is scheduled for H&TC Section 23, Block 3. In the meantime Abell et al have moved in a rig for F. A. Knapp 1, Lot 6, H&GN Section 22, Block 9, making the third 2500-foot test drilled since last November in the north portion of Pecos County, with majors contributing cash for the fulfilment of the program.

New wildcat tests to the west and northwest of Fort Stockton have been obligated for acreage. Clayton Williams et al contracted to drill a 3000-foot test, centering 5 miles west of the town. Location is on the H. J. Eaton land, near NEc Section 1, J. H. Handy Survey, Block 203. Abell et al obtained lease on 18 sections, centering upon Block 106, T. & St. L. Survey and Block 115, GC&SF Survey, 11 miles northwest of the town, for a 3500-foot test.

More drilling is in store for two Ector County areas through the completion of flowing outposts. Sinclair Prairie Oil Company's Fay Holt 1, ¾ miles west of the north end of North Cowden field, flowed 561 barrels initial production after a nitro shot in broken pay at 4165-4305 feet. Atlantic Refining Company's Johnson 1-D, a mile east of Johnson pool and the same distance north by east of the Foster field, flowed 395 barrels initially after nitro and acid treatment of pay at 4085-4225 feet. Each requires three offsets and the intermediate acreage will be subject to early development. Johnson 1-D proves more acreage than any extension well completed in the county this year, due to its relative position to two prorated areas which undoubtedly are on the same structure.

West Texas Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Andrews County (Wildcat)—		
Atlantic-Standard of Texas, University 1-B	*	4310
Andrews County (Fuhrman)—		
Gulf, W. T. Ford 1-A	147	4460
Crane County (Gulf-Waddell)—		
Magnolia, W. P. Edwards 12	47	3529
Crane County (Church-Fields)—		
Great Western Prod., University-Phillips 1-B	127	3417
Crane County (Sand Hills)—		
American Liberty et al, Tubbs 7	1749	4430
Ector County (Foster)—		
Sunray Oil Co.-York & Harper, Foster 8-D	420	4254
Witcher 2-B	800	4296
Ector County (North Cowden)—		
Sinclair Prairie, Fay Holt 1	561	4305
Ector County (Harper)—		
Oil Well Drl. Co., Cowden 6-B	67	4278
Ector County (Johnson)—		
Atlantic, Johnson 1-D	395	4225
Hockley County (Slaughter)—		
Richardson et al, A. E. Coe 1	2048	5182
Howard County—		
Eastland Oil Co.-Ambassador Oil Corp., T. P. Land Trust 3-B	962	2791
Jones County—		
Bert Fields & Carey King, Taylor 3	5900	3251
Humble & S. B. Roberts Co., Bickley 1-B	*	3170
Peckham et al, B. C. Humphrey 1	590	3278
Ungren-Frazier et al, J. A. Brock 1	202	1906
J. M. Griffin 2	2012	3068
Jones County (Wildcats)—		
Gregg Oil Co. et al, E. D. Appling 1	412	2638
Roberts Co. et al, L. A. Collier 1	*	2280
Pecos County (Taylor-Link)—		
Landreth Prod. Corp., University 2-H	878	1624
Pecos County (Wildcat)—		
Abell et al, O. W. Williams 1	*	2464
Stonewall County (Carlisle)—		
W. I. Southern, H. T. Carlisle 2	248	5152
Taylor County (Wildcat)—		
Tal-Vez Oil Co., D. T. Hooper 1	¶¾	2297
Ward County—		
W. P. Luse & Ice, Brictson 6	203	2090
Magnolia, Geo. Sealy 1-45	284	2831
Sahara Oil Corp., Winter Garden-Humble 3	412	1900
Standard of Texas, Adams 11	315	2670
Western Well Service Corp., Lackland 3-6	214	2107
Winkler County (Colby)—		
Sun, Walton 3	48	3372
Winkler County (Kermit)—		
Magnolia, Walton 222	211	3259
Winkler County (Scarborough)—		
Gulf, Daugherty 69-N	108	2993
Richardson et al, Scarborough 4-E	248	2970
Yoakum County (Bennett)—		
Mabee et al, Willard 5	3060	5230
Shell, J. M. Ruyts 1	161	5266
Yoakum County (Wasson)—		
Tide Water Associated, H. Koontz 1	1123	5125

* Failures; † Junked; ¶ Million cu. ft. gas.

Texas permits to drop to 180

The Texas Railroad Commission last week approved permits for drilling 180 new wells in Texas, 67 less than were allowed the week before.

There were seven locations approved in the East Texas field, including four in Gregg, two in Upshur and one in Smith County. From the remainder of the East Central Texas area 20 locations were reported.

Operators in the Gulf Coast section were allowed 47 permits, including 16 in Harris County, while Southwest Texas operators listed 35 approved permits.

There were 17 permits granted in West Texas, while 21 were reported from West Central Texas. The commission approved 25 permits to North Texas operators, and allowed Panhandle producers eight.

Seek 20-acre spacing at Keeran

Twenty-acre spacing for deep wells in the Keeran field, Victoria County, was requested last week at a hearing before the Texas Railroad Commission. Operators agreed unanimously on the program, which includes straight acreage proration. Because of the irregular shape of leases, wells would be spaced 466 feet from lease lines, and 850 feet apart. Straight 20-acre spacing calls for 933 feet between wells.

Testimony presented at the hearing

Texas Panhandle Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Gray County—		
Magnolia, Fee (lease 227) 27	105	2910
Hutchinson County—		
Cree & Hoover, W. B. Haile 3	910	3026
Phillips, Cockrell 38	300	3063
Gary-Whittenburg 8	205	3268
Moore County—		
Texoma Nat. Gas Co., Sneed 15-SN	¶29	3006
Sneed 16-SN	¶15.5	2969
Terry Thompson 6-TH	¶51	3225
Wheeler County—		
Williams et al, Bentley 3	20	2390

* Failures; † Junked; ¶ Million cu. ft. gas.

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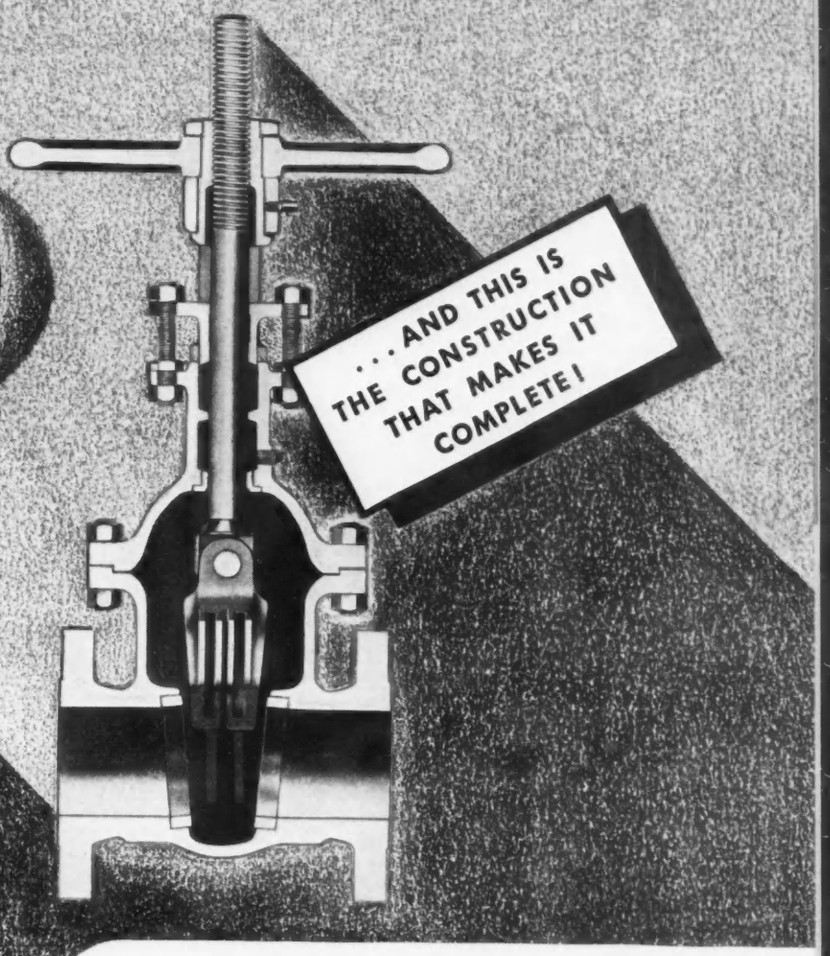

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shows that production is from approximately 7000 feet and that three wells are now producing from this horizon. The producing section in the Frio is about 18 feet thick. The oil produced is 40.1 gravity, flowed with a gas-oil ratio of about 900/1. Average porosity is 20.1 percent and permeability is 1286 milli D'arcys. Bottom hole pressure is 3183 pounds, about normal for the depth.

The operators recommended 1250 feet of surface casing cemented to the surface to protect fresh water sands found between 1100 feet and 1200 feet. The oil string would be set with 300 sacks of cement.

Protest closing of Agua Dulce wells

The Texas Railroad Commission last week heard protests from operators against closing in certain wells in the Agua Dulce field, Nueces County. The wells are producing from the 6400-foot sand which is also the source of gas now flowing from the Sullivan crater nearby.

The operators complained that the railroad commission had not succeeded in having the cratered well killed and indicated that they expect no relief from this hazard.

They asked that they be allowed to produce their wells wide open in order to compete with the crater. Union Producing Company suggested that the field might be closed down entirely for 60 days to determine by testing their bottom-hole pressures whether the crater is draining the wells closed in.

Sharp pressure drops from the closed wells was recited as evidence that the field is not being benefited by the order, and that unless the operators are permitted to reopen these wells, their gas will be lost.

Large area under lease in Forrest City Basin

St. Joseph, Mo.—Estimates have it that the leasing play in the Forrest City Basin has brought 6,500,000 acres under lease in three states. Missouri is credited with two thirds of this total with the remainder in Kansas, Iowa and Nebraska.

In Missouri chief attention is being given to filling in blocks, perfecting titles and seeking to sell spreads to finance drilling.

The Missouri part of the basin has one test drilling, one rig standing and material being moved in for three others. J. H. Everett has set 8-inch casing at 225 feet in Spring 1, SWc SE 30-62n-38, Holt County, the one active rig in the state. Material is being moved in by Patsy Oil Company to drill Gaffney 1, SW SE SW 24-63n-38w, also in Holt County.

Clay County has two rigs moving in: Frank Hopper and associates are moving in to drill Black 1, NWc 36-52n-32w; and Eastern Drilling Company is moving in for Williams 1, NW NE 28-43n-32w. The rig set up by H. V. Elwell, Taylor 1, C EL NW 12-62n-21w, Sullivan County, is still inactive.

The Kansas part of the basin drew another location last week when W. M. McNabb staked location for Spurgeon 1, SE SW SE 28-1-15e, Jackson County. His Huffman 1, 4-12-14e, is reported ready to set 8-inch pipe at 2100 feet. This well is on the eastern part of the basin.

North Texas Fields

Bonita discovery offset is failure in Strawn. Completion presages revival of K-M-A east area.

Wichita Falls, Texas.—An offset to the discovery well of Bonita pool, eastern Montague County, has failed to make a commercial producer after making a greater penetration of the Strawn saturated zone. United Producers Company and Continental Oil Company's Langford 1, NEc Section 47, MEP&P Survey, swabbed dry through tubing from sandy-lime at 2920-33 feet, and in deepening to 2938 feet filled at rate of 3 barrels of oil daily. It is south of Joe Benton, J. W. Holmes et al's Bowers 1, which opened the new area and touched off a large lease play last January in flowing 70 barrels natural at 2887-2898 feet. The original well has since experienced trouble with mud in the hole, and is installing a spudder to clean out. It may be deepened.

No immediate pipe line connections will be available to the recent prolific natural producers completed by wildcatters in western Clay and northwestern Archer counties. Eph Griffin et al's Waggoner Estate 1, located 4½ miles southwest of nearest production in the K-M-A deep area, is marketing its 100 barrels allowable in tank trucks at a Mankins refinery. This well flowed 95 barrels of 42.1-gravity oil in 3 hours through ¾-inch choke from lower Strawn at 4393-4410 feet. Operations have been started on a north offset. The completion of this well in the lower pay may result in the deepening of previous tests in the area, including those in the west portion of K-M-A, since they were abandoned after failing to produce in the upper Strawn. L. T. Burns et al's Browning 1, western Clay County strike, will also have to rely on tank truck shipments for an outlet for its 100 barrels daily allowable.

Eastern Archer County is assured of another deep test. Jack Kadane et al made location for J. Hammi 1, 466 feet out of the NEc Section 60, Block 3, Clark-Plumb subdivision, 2 miles south of Scotland and 3 miles southwest of a small Strawn wildcat pumper. It will be drilled to 5600 feet, or water in the Ellenberger lime.

Revival of development in the extreme east portion of the K-M-A deep area is likely to follow the completion of Grace-Woods et al's M. A. Love 1, minor outpost in the W. S. Kennard Survey No. 129. The hole filled with oil in 12 hours after drilling sand pay at 4013-29 feet with a spudder. Top of the lime was logged at 3810 feet, and first lime saturation at 3933-98 feet. The well flowed 75 barrels in 30 minutes after a 290-quart shot at 3933-4029 feet and will be given a potential test later in the week. Magnolia Petroleum Company's Van Meter 1, NWc lease, Block 36, southeast portion of the field, flowed 64 barrels of oil in 3 hours for a potential after building up pressure. Tubing pressure dropped from 305 to 25 pounds and casing pressure was lowered from 235 to 135 pounds during the test. The well was shot with 40 quarts of nitro at 3865-73 feet after plugging off non-porous lime at 3887-93 feet. The field currently has 50 operations, including 14 tests drilling with rotary above the Strawn and 16 wells in process of completion.

Petroleum Producers Company and Continental Oil Company's Finkler 1, south offset to the partnership's Bend lime discovery made last year in the

North Texas Completions

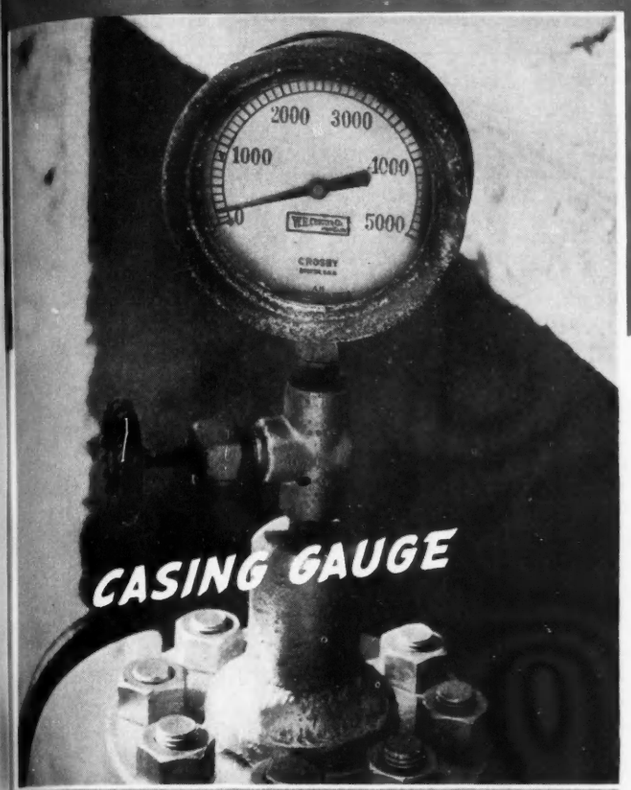
Company, Well and Location	Init. Prod. Bbls.	Depth
Archer County—		
Burns et al, Carpenter 6, sec 39..	*	1838
Continental, DeMoss 4	*	1253
Cree & Hoover, Turbeville-Texas Co. 3, blk 157	59	1510
Fresno Oil Co., D. M. Powell 1....	7	1032
D. M. Powell 2	*	1321
Horwitz & McDaniel, Benson 11, sec 1808	8	935
Rathke Oil Co., C. Cowan 4, blk 15	96	1134
C. Cowan 5, blk 8	30	1131
Archer County (Wildcats)—		
Bridwell Oil Co., Veitenheimer 1, sec 60	*	1117
Burns et al, M. Thuman 1, sec 1847	*	1132
Griffin et al, Waggoner Est. 1, sec 3	760	4410
Clay County—		
Duncan-Arnhold et al, Duncan 8, blk 14	78	1200
Clay County (Wildcats)—		
Burns et al, Browning Bros. 1, blk 94	900	4461
Wood Pet. & Roy. Corp., Kempner 1, blk 44	*	4268
Cooke County—		
Schermerhorn Oil Co., M. Kessler 21, blk 5	58	1370
Thompson et al, Joe Wiseman 2..	67	911
Montague County—		
Seitz-Comegys & Seitz, Roach 6-B.	269	2146
Throckmorton County—		
Pennell et al, H. A. Allison 1, sec 2234	*	419
Wichita County (K-M-A)—		
Board of Mineral Dev.-G. & W. Drl. Co., Big Wichita River 6.....	672	3750
Consolidated Oil Co. et al, Ferguson 20, lot 11	824	3784
Cooper et al, Waggoner Bros. 54, sec 8	360	3900
Deep Oil Dev. Co., Munger 21, blk 24	392	3855
Magnolia, Van Meter 1	512	3893
Peckham et al, Munger 4, blk 31..	896	3885
Wichita County—		
Hawkins & McQuigg, Goetze 8....	3	433
Hamilton et al, Martin 5-A, blk 7..	*	566
King Oil Co., Waggoner Est. 7-R, blk 15	144	1622
Marchand et al, H. Willis 20.....	1	283
Panhandle Ref. Co., Stone 14.....	*	1868
Ray Est. et al, Mitchell 1-S, blk 18	11	517
M. Staniforth Co., Jennie 1.....	*	1353
Ed. Reilly 2	50	1384
Wilbarger County—		
Phillips-King Oil Co., Waggoner-King 3	720	3215
Young County —		
Craig et al, R. L. Morrison 1, sec 159	*	1126
Head-Roberts & Swink, Routan 1, sec 265	*	796
King et al, Stewart 1, sec 1493...	*	875
Kriss & Hanson, C. E. Howard 1, sec 243	*	740
Langille-Flato et al, T. F. Harmon 1	8	590
Mid-Continent, Owens 16-B.....	401	4305
Parkin et al, A. W. Hardy 1, sec 251	*	702
Pitzer-West & Tide Water Associated, Gardner 4, sec 614.....1512		4025
Power et al, Larrimore 1, sec 253	10	585
Seiboldt Drl. Co., Wolf 2, sec 623.	550	3996
Stuckey O&G Co., G. B. Hamilton 1 sec 3401	*	932
Henry Zweifel et al, R. D. Sewell 1-C	601	3960

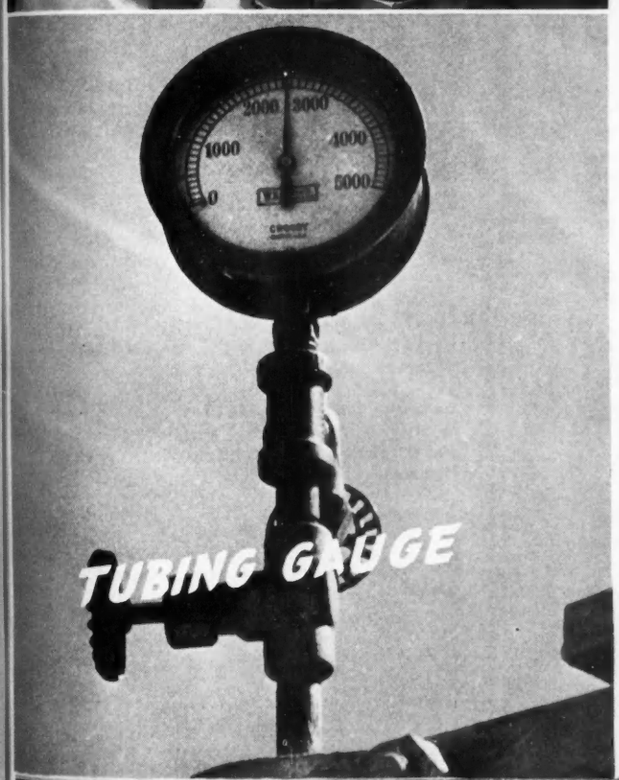
* Failures; † Junked; ¶ Million cu. ft. gas.

SE TWO SURFACE GAUGES INDICATE A PERFECT SEAL BY THE

AMERON *type "G"* PACKER

10,250 FEET BELOW THE SURFACE





Surface gauges tell the unquestionable truth about the success or failure of a packer setting.

These two gauges reflect, as clearly as a photograph, the successful seal made with a Cameron Type "G" Packer on Harrison and Abercrombie's Larsen-Edling No. 1, Old Ocean, Brazoria County, Texas. This well is approximately 10,250 feet deep, and has a bottom hole pressure of more than 4,500 pounds.

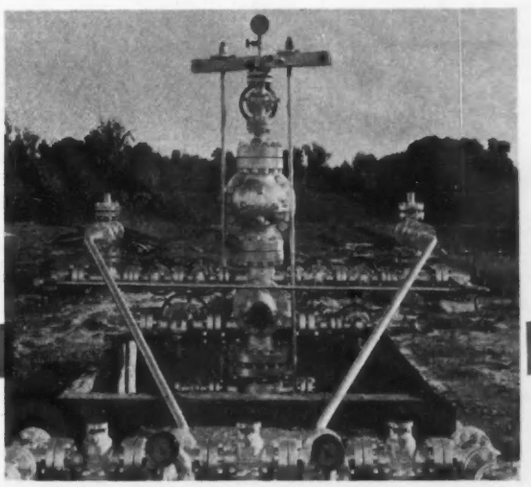
As shown by the tubing gauge, there is a surface flow pressure of 2,550 pounds on the tubing. (Tubing flow pressure is restricted by two Cameron Bottom Hole Chokes. See page 509 of the 1939 Composite Catalog.)

As shown by the casing gauge, there is an oil string pressure of approximately 150 pounds, attributed to slight expansion of the tubing under pressure. This casing pressure is constant, without being bled off, which indicates beyond question that the packer is holding tightly.

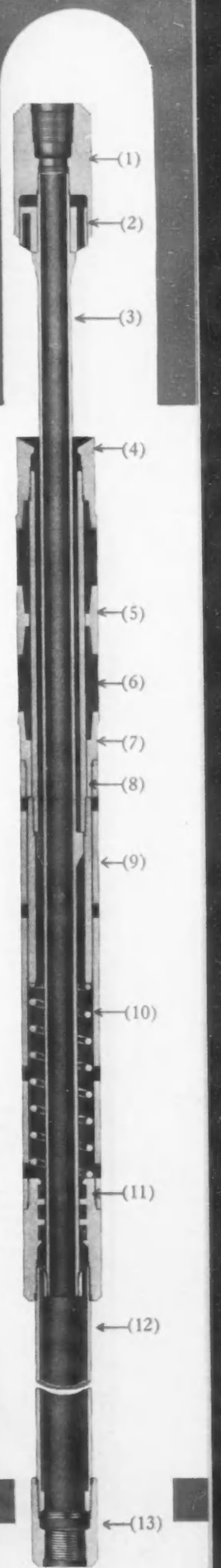
Larsen-Edling No. 1 is one of more than a score of wells at Old Ocean that have been similarly completed with Cameron Type "G" Packers and Cameron Bottom Hole Chokes. Elimination of oil string pressure above the packer, and restriction of tubing flow pressure to 2,550 pounds, provides these operators with a sense of security they would not enjoy without the contribution made by these two highly efficient tools.

Principal parts of the Cameron Type "G" Packer are as follows: (1) Valve cage; (2) Valve packer; (3) Flow pipe; (4) Valve seat; (5) Packer spacer; (6) Packers; (7) Packer retainer; (8) Mandrel; (9) Lower sleeve; (10) Spring; (11) Seal rings; (12) Drive nipple; (13) Reducing coupling.

Operators confronted with bottom hole packer problems, or with bottom hole choke problems, are cordially invited to request full information concerning these two outstanding tools.



CAMERON SAFETY XMAS TREE ON LARSEN-EDLING No. 1, OLD OCEAN FIELD, BRAZORIA COUNTY, TEXAS.



Cross-section view of Cameron Type "G" Packer showing simplified design and rugged mechanical construction.

CAMERON IRON WORKS, INC.

711 Milby Street, Houston, Texas

EXPORT: 74 Trinity Place, New York, N. Y.

Asylum area, southeastern Wichita County, filled 4000 feet with oil and flowed by heads when agitated after a nitro shot and multiple acid treatments. Production is from saturated lime at 5089-5141 feet. The hole was plugged back from 5152 feet.

Highway users fight railroad campaign against motor travel

Charging that the railroads have engaged in a propaganda campaign against motor trucks in violation of an agreement designed to encourage the use of all forms of transportation in the United States and are seeking the enactment of laws taxing and handicapping highway use, the National Highway Users Conference, of Washington, has announced that, in the interests of highway users, it will fight back.

The conference has announced also that it will seek to "expose all the railroad schemes to restrict the use of the highways, the effect of which would be to increase transportation costs to the public." Belief is indicated in the conference announcement that while the railroad drive is directed against motor trucks, with the effect of taxing excessively and restricting operations needlessly, the final result would be to handicap highway use generally.

Alfred P. Sloan, Jr., chairman of the board of General Motors Corporation, is chairman of the conference, with Thomas P. Henry, long-time president of the American Automobile Association as vice chairman. The secretary-treasurer is L. J. Tabler, master of the National Grange.

Restriction of highway use, either by taxation or regulation, is viewed as a direct blow to American farmers, who now own and use nearly one quarter of all the motor trucks registered. A substantial part of the merchandise transported by other trucks consists of milk, cattle, and other agricultural products.

East Texas Fields

Leon County wildcat looks like Woodbine distillate well. East Texas field completions falling behind depletions.

Tyler.—A northeastern Leon County Woodbine test gave promise of gas-distillate production that may establish a new area or provide a four-mile northwest extension for Navarro Crossing oil and gas field, Houston County.

Northwestern Henderson County's bid for a new pool was strengthened when the preliminary test of a wildcat indicated a commercial pumper.

Humble Oil & Refining Company and Sun Oil Company's Swift 1, H. W. Sublett Survey, first outpost for the Navarro Crossing field along the northwest trend, topped the Woodbine series at 5718 feet, with an elevation of 224 feet. Formation samples recovered in coring to 5755 feet yielded evidence of gas and distillate production. The main oil or gas horizon will be found about 100 feet below the first Woodbine, based upon the record of Navarro Crossing wells. Swift 1 topped the Woodbine series about 20 feet higher structurally than nearest producers. It will be deepened and then will run pipe for a production test.

Several small heads of oil were made the past week by A. J. Tyler, Charles O. Smith et al's Rowe-Baker 1, located on the Mexia-Talco fault and 3½ miles northeast of the Flag Lake pool, Henderson County, from Woodbine at 3140-3147 feet. Pumping equipment is being installed. Richards and Holloway, drilling contractors, have an interest in the wildcat, which is a northeast outpost to a failure drilled in 1925. The comparatively thin sand section and dry holes indicate that the potential producing area will be extremely narrow and along a northeast to southwest trend.

In Freestone County, Jack Frazier et al's Fred Marberry 1, 1½ miles northeast of Kirvin, encountered water in the Woodbine at 3822-3831 feet; plugging orders were pending.

Limestone County has two active wildcats. A third project authorized will seek production in the Upper Trinity. Stanley Thompson et al's Nance 1, 4½ miles east by north of Kosse, logged top of the Austin chalk at 2941 feet and was drilling at 2960 feet. Harvey Richardson et al's Banks 1, 2½ miles northeast of Thornton, was drilling at 2370 feet.

Murray Samuell et al have taken a 6000-acre block for a 5000-foot test to be drilled on the W. G. McKenzie Survey, between Thornton and Groesbeck. It will explore the Barron fault, which is the most easterly of the fault series in the district. The block was assembled by V. V. Waite, Dallas consulting geologist.

East Texas drilling will not offset depleted wells

Kilgore.—The volume of drilling in the East Texas field has been temporarily curtailed to a level that will not yield sufficient completions to equal the quota of depleted oil wells that are being plugged The current field report lists 10 operations, including six drilling tests. No majors are engaged in drilling at present.

Twenty additional wells have been added to the depletion list, representing an accumulation of several weeks.

Long Lake to get recycling plant

Tide Water Associated Oil Company and Seaboard Oil Corporation of Delaware, partners in the development in the Long Lake and Cayuga pools, Anderson County, Texas, have announced plans for construction of a new extraction plant at Long Lake. The same partners announced completion of enlarged units on the year-old Cayuga plant, which was scheduled to resume operations on the enlarged scale on Tuesday, March 21.

Contract for the proposed Long Lake

SOUTHERN
PUMPING UNITS
FOR CRUDE OIL OR REFINED LIQUIDS
• Pumps are either Rotary or Centrifugal.
• Motors are either Gas, Gasoline, Diesel, or Electric.
• Capacities from 50 to 500 barrels per hour.
SOUTHERN
ENGINE & PUMP COMPANY
HOUSTON, DALLAS & KILGORE, TEXAS

East Texas Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Kilgore Area—		
Gulf, Davis 10 (50-ac)	5600	3558
Potter Bros. Prod. Co., Crim 2, blk 121-B	1500	3570
Longview Area—		
Davis & Smith, Mattox 6 (39-ac)	144	3631
Shell, Stinchcomb 20 (89¾-ac)	5000	3528
Falls County—		
Hayes et al, M. Murphy 1	33	1221
Houston County (Wildcats)—		
Humble, G. W. Mobley 1	*	5958
Leggett & Gossett, B. F. Gardner 1	*	2200
Trinity County (Wildcat)—		
Davis et al, J. D. Gibson 1	*	2630
Upshur County (Wildcat)—		
Brown-Gardner-Higginbotham, Crawford 1	*	4173

*Failures; †Junked; ¶Million cu. ft. gas.

plant was awarded to J. F. Pritchard & Company, engineering firm of Kansas City, which has had a corps of engineers at work on drafts for several weeks. The plant will be erected on the Shaw & Cern lease, in the Daniel Parker survey. Clearing of site location is under way and work on the office building will begin during the week. The plant will be in operation within ninety days, according to the plans.

The Long Lake unit will serve a territory of from 2000 to 3000 acres. It will have a capacity of from 25 million to 40 million cubic feet per day, with condensate production amounting to between 25,000 and 40,000 gallons daily. It will have engine compressors of 1000 horsepower, consisting of two 300 and one 400 angle-type machines. Condensate will be extracted under extremely high pressure with the use of ammonia refrigeration, and residue gas will be returned to the Woodbine reservoir. A stabilizer unit treats the raw product, and a rerun distillation device produces a finished product of a condensate of desired specifications, or a natural gasoline or motor fuel, as the market may demand.

The project will cost approximately $250,000 to $300,000 and will employ from 15 to 20 men.

The enlarged Cayuga plant increases the capacity around 10 million cubic feet daily to from 25 million to 30 million cubic feet. The unit will process around 25,000 gallons of condensate, as compared to around 10,000 gallons under the old setup. Now the plant has a horsepower of 975, an increase from 400. It is using about 200 tons of refrigeration and will draw from 10 wells in the area. The plant represents an investment of approximately $250,000 and was the first built in East Texas.

Shreveport.—Superior Oil Company of California has been negotiating recently with Redditt and Gray for the latters' holdings in the Joaquin gas/distillate field, Shelby County, Texas, but so far as known no transfer has been consummated.

In the northeast corner of San Augustine County, Texas, E. B. Larue has secured a 2500-acre lease from Pickering Lumber Company, agreeing to drill a 4200-foot test. In Jasper County, Texas, Tucker and Shelby of Beaumont, have assembled a large block in and around the Briton Hall Survey.

Schuler production

El Dorado, Ark.—Total cumulative oil production to February 1, 1939, from the three horizons in the Schuler field, Union County, is 7,867,745 barrels from 131 wells. The production by horizons follows:

Morgan sand, 12 wells, 1,491,056 barrels; Jones sand (lower Marine), 110 wells, 5,935,681 barrels; Reynolds (Permain) lime, 9 wells, 441,008 barrels.

The recovery from the Jones (lower Marine) sand to February 1, 1939, was 53,960 barrels per well, which on a basis of an average market value of 75 cents per barrel and deducting the one eighth royalty, would give a net return to the working interest per well of $35,412.25. In general, taking into consideration all three horizons, Schuler is said to have paid back 50 percent of its development costs. The first sand discovered, the Morgan sand in the Travis Peak horizon, was not found until late in 1936.

Official gauges made on Panola County wells

Shreveport.—The Texas Railroad Commission recently completed a 24-hour potential test on four deep gas-distillate wells northeast of Carthage, Panola County, and also on The Texas Company's recently completed Glen Rose test in the Bethany field plugged back from Permian salt. The gauges follow, pounds being shut-in pressure:

Glassell & Glassell's Frost 1, 4,400,000 cubic feet, 2625 pounds; Glassell & Glassell's Williamson 1, 9,300,000 cubic feet, 2645 pounds; Magnolia Petroleum Company's E. A. Hull 1, 2,450,000 cubic feet, 2664 pounds; Magnolia Petroleum Company's E. A. Hull 2, 10,016,000 cubic feet, 2700 pounds, and The Texas Company's Claude Adams 1, 17,900,000 cubic feet, 2500 pounds.

Union Producing Company has agreed to take 15,000,000 feet daily from The Texas Company's Claude Adams 1 at Bethany. Distillate production from this well is said to be 20 barrels per million cubic feet, which will be moved by truck to Texas Pipe Line Company's line.

At Joaquin, Shelby County, Portex Oil Company's re-cycling unit is processing 20 million cubic feet of Glen Rose gas daily, securing approximately 250 barrels of distillate daily or a ratio of 80,000 to 1.

El Dorado, Ark.—Only one drilling permit was authorized last week by the Arkansas Oil and Gas Commission, this being Standard Oil Company of Louisiana's J. J. Gunnels Unit 1, located 660 feet south and 665 feet west NEc SE NE 16-17-19.

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ARE LIKE CHILDREN

. . . . start them off right and they are likely to keep going successfully.

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JENSEN Pumping Units are inexpensive, but they are easy to install and smooth in operation. Aside from lubrication, they require no attention.

Even if you are satisfied with the equipment you have been using, it's good business to find out about these JENSEN Jacks.

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Southwest Texas Fields

La Gloria discovery well initials 165 barrels.

Clark field's first well now making distillate.

Corpus Christi.—Jim Wells County was restored to stellar position in South Texas Gulf Coast's interest last week with one discovery and another potential discovery well in final stages of completion. Both events apparently are the forerunners of considerable drilling.

Magnolia Petroleum Company's Maun 1, lot 25, block 10, La Gloria subdivision, southern portion of Jim Wells County, on a 24-hour gauge flowed 165 barrels of 60 gravity distillate with 5,646,000 cubic feet of gas through 5/16-inch choke. It showed pressures of 2000 pounds on tubing and 2170 pounds on casing. The well, commenced in November, had been carried to 7545 feet, but was plugged back for completion through perforations at 6560-6570 feet, where 18 shots were made.

Drilling To Be Delayed

A number of operators hold acreage in the general vicinity but an immediate drilling play is not expected. The high gas volume will make recycling necessary before the well can be regularly produced. As a result, it may be anticipated that much lease work will be done before active development of the area is underway.

Several miles to the northeast on Blucher field structure, Shell Petroleum Corporation is planning immediate operations on Von Blucher 2, about 1865 feet east of the discovery. The first well on this structure made a distillate producer.

Gravis & Doran's Clark 1, after being perforated at 4795-4818 feet, flowed mostly gas, but is now making distillate or light oil. The well is classified as the discovery of the Clark field (unofficial name), about 1 mile east of the present East Alice field production. Another mile farther east, Tom Graham's Adams 1, perforated in sand section at 4923-4940 feet, was testing. On first completion attempt in the same sand the well made oil and fresh water, apparently drilling and wash fluid. Both wells are believed to be in the same sand. Gravis and Doran have commenced Muil 1, one mile to the south of these wells.

Riverside field, Nueces and San Patricio counties, received additional setbacks. Republic Natural Gas Company's Crockett 1, Day Land and Cattle Company Survey, 14,000 feet northeast of oil production, was abandoned at 5525 feet, having run low structurally.

Agua Dulce Extended

Lockhart Brother's Winfield 1, in sand at 4730-4745 feet, and Union Producing Company's Kinzie 1-A, in the zone at 4851-4860 feet, made excellent distillate producers to further extend Agua Dulce field, Nueces County, to the northeast. Both wells provide new acreage for development on this structure.

Drilling to a reported depth of 9500 feet, Richardson Petroleum Company's Sherwood 1, about one mile southwest of production in the McCampbell field, San Patricio County, was preparing to abandon. Production in the field ranges from 6650 feet to 7200 feet. The area is the center of a hot drilling play.

Plymouth Oil Company drilled Brooks 3 to 8383 feet, depth record for East White Point, but plugged back for completion in the regular oil sand at 5681-5690 feet.

Several key outpost wells to Refugio County fields were at critical levels as the week closed. As a result, this county may see important extensions during the coming several days.

Magnolia Petroleum Company added another 1320 feet to the west side of the West Ranch field of Jackson County with N. B. West A-9. The well cored sandy shale and sand with gas from 5007-5090 feet, shale to 5108 feet and saturated oil sand to 5131 feet. Although it found 25 feet of saturation, the last 10-foot section was used for completion, pipe being landed at 5121 feet. Production was 298 barrels of pipe line oil per day through 3/16-inch choke, with pressures of 575 pounds on tubing and 600 pounds on casing. The gas/oil ratio was 229 to 1.

Cook Mountain yields oil in Pettus district field

Beeville.—Mar-Tex Oil Company has placed the Pettus district of South Texas in the Cook Mountain producing division when W. M. Albrecht A-1, tract 3, Weser field of Goliad County, flowed 28 barrels of high gravity distillate per day through ¼-inch choke after casing was perforated at 5232-5240 feet with 18 shots. The pressures were 1560 pounds on tubing and 1650 pounds on casing, with gas/oil ratio estimated at 100,000 to 1.

This well is 1980 feet east of Steinberger Petroleum Corporation's Albrecht 1, which unsuccessfully attempted completion in the same sand and was finished as a gas well in the regular field pay in the Yegua zone. A sand section from 5229-5240 feet was encountered in the new discovery, but the well was drilled to 5312 feet, completion being in plugged back hole.

Mirando trend wildcatting showing marked increase

Laredo.—An increased volume of wildcatting in the Mirando district, especially on the deep trend, has been evidenced during the past several weeks. A majority of the wells are projected to the Cockfield formation, productive in the newer fields in the general vicinity of Benavides.

Nearly one mile northwest of production in Laurel, Webb County, Smith and Story, Incorporated's Houston Oil Company of Texas 1 plugged back from the Laurel sand at 2445 feet, which was hard and dry, for a completion attempt in the Mirando zone. Casing was landed at 1830 feet and liner set at 1900 feet, plugged back depth. Perforations

South Texas Completions

SAN ANTONIO DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Bexar County—		
Cook Bros., Russell 3, Mission Alta Vista	17	1076
Philtop, Patton 5, Mission-Alta Vista	103	1312
Zavala County—		
Wilcox, Gilliam 4, Batesville, wildcat	*	4014
LAREDO DISTRICT		
Duval County—		
H. H. Coffield, Peters 1, Rancho Solo, wildcat	*	2745
Continental, A-34 Driscoll, Driscoll	400	3375
Dutex, State A-4, Piedra Lumbre	231	2222
Gravis & Doran, Parr 1, Sweden, wildcat	*	6281
Magnolia, DCRC 20 (201), Eagle Hill	¶3	2204
Well 29, Hoffman	245	2840
Rowan & Hope et al, Cuellar 4-B, Hoffman	108	2579
Transwestern, DCRC 19 (368), wildcat	*	1987
McMullen County—		
H. Ezzell, Fee 29, Ezzell	100	1475
Fee 33, Ezzell	159	1495
Holbrook-O'Farrell, Miles, sur 143, wildcat	*	1514
Jones, Ezzell 68, Ezzell	63	1533
Ezzell 70, Ezzell	66	1538
Schimmel, Hagist 1, sec 123, wildcat	*	2134
Starr County—		
Banks-Miller, Garcia 2, por 71, wildcat	*	665
Staggs, Ricaby 1, Woods, wildcat	*	2553
Zapata County—		
Buffalo, Hinnant A-7, Mirando Valley	146	1956
C. M. Leake, Vela 1, sec 5, wildcat	*	2511
Nordan & Morris, Haynes 11-C, Comitas	63	1240
CORPUS CHRISTI DISTRICT		
Aransas County—		
Rantex, Hyde and Jambers 1, McCampbell	1000	7225
Brooks County—		
Humble, McGill 6, Kelsey	*	4785
Goliad County—		
Martex Oil Co., Albrecht 1, Weser, wildcat	¶2¾ & 28	5312
Hidalgo County—		
Fohs, Sullivan 1, Samfordyce	135	3462
Pan American, Vina 1, Mestinas grant, wildcat	*	8123
Jackson County—		
Magnolia, West A-9, West Ranch	750	5131
Jim Wells County—		
Graham, Bankers Mortgage H-2, East Alice	400	5700
Magnolia, Sam Maun 1, La Gloria, wildcat, discovery well of field	¶2½ & 69	7545
Parr, Carter 1, LaVaca grant, wildcat	*	5518
Live Oak County—		
Harry Hotchkin, Wade 1, Sommers sur, wildcat	*	2438
Nueces County—		
Davis, Schultz 2, Agua Dulce	*	6042
Graham, Shary 1, Clara Driscoll	167	5839
Killam, Myers 1, Clara Driscoll	135	5720
Lockhart, Winfield 1, Agua Dulce	¶2 & 90	4950
Seaboard, Luby 48, Luby	450	4363
Union, Kinzie 1-A, Agua Dulce	¶3 & 120	4898
Refugio County—		
Coronado, Rooke 10, LaRosa	500	6360
Rooke 11, LaRosa	500	6345
Houston, Pratt - Hewitt - Rooke 61, Refugio	550	6221
Quintana, O'Conner A-79, Tomoconnor	1100	5925
San Patricio County—		
Abbott & Traxler, Community 2, McCampbell	1100	7145
Graham, Robinson 2, McCampbell	1050	7160
Grote & Corgey, Miller 1, McCampbell	1100	7178
Peoples 2, McCampbell	1100	7150
Houston, Baldwin 1-A, East White Point	750	5670
Plymouth, Ficke 4, East White Point	500	5668
Wilson 1, John Brown sur, wildcat	*	7038
Rantex, Walker-McCarthy 1, McCampbell	1050	7240
Republic Natural Gas, Crockett 1, Riverside, wildcat	*	5525
Smith & Buckner, Barfoot 3, McCampbell	1150	7226
Victoria County—		
Barnsdall, McFaddin 20, McFaddin	350	4402
McFaddin 22, McFaddin	450	4404
Gulf, Traylor B-18, Heyser	600	5485

* Failures; † Junked; ¶ Million cu. ft. gas.

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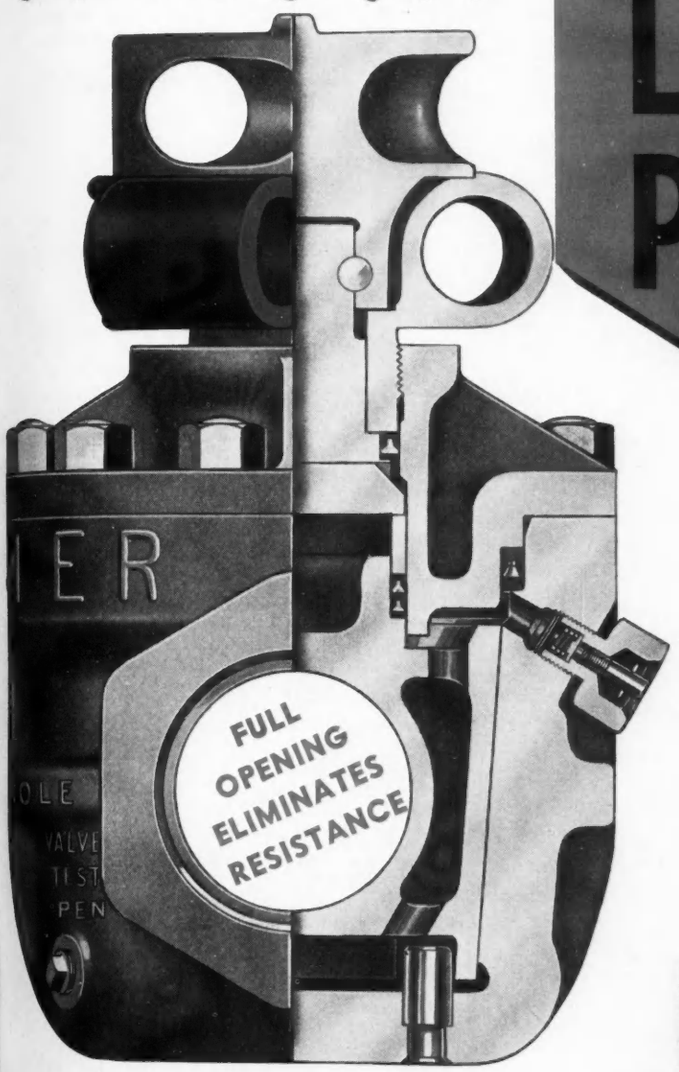


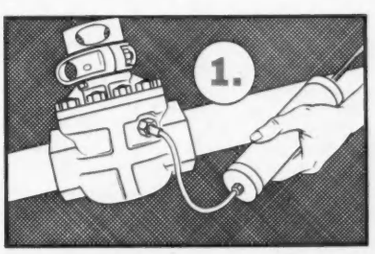
NOTE how the elevator nut shoulders under the plug head. A turn of the nut to the left causes it to rise on the thread, positively lifting the plug to a free-turning position. A turn of the nut to the right presses the plug down again to the proper drag fit in the body. It's as simple as that. A short bar is used to turn both the elevator nut and the plug (eliminates slipping wrenches).

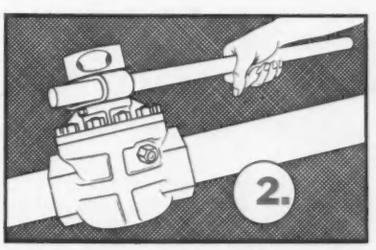
And another thing: Note the round hole that gives a full, unrestricted opening through the valve. These Hamer Plug Valves quickly pay for themselves by eliminating sticking troubles, and by removing resistance, thus saving maintenance of your pumps. Let us send you all the facts — or have a Hamer representative call on you — TODAY.

Hamer E-Z Turn Lubricated All Steel Plug Valves are available in both the Round Hole—Full Opening and Standard types. For complete descriptions and sizes see the Hamer section in your 1939 Composite Catalog, or send for literature.

ONLY TWO THINGS TO DO

***1. LUBRICATE** the valves once a day. It takes only a few minutes time to lubricate all of the Hamer Valves on the rig—and it is an easy way to insure their smooth operation and long service life. Many operators connect small lines from the pump oiler to the Hamer Plug Valves to lubricate them automatically.*





***2. KEEP THE PLUG DOWN** to an easy-turning drag fit in the body by adjusting the elevator nut to the right. Maintain this adjustment. Lift the plug **ONLY** when it is too tight for easy operation — then immediately readjust it to the proper E-Z turn position.*

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were made opposite sand section at 1834-1866 feet, all of which showed oil when cored.

Holbrook-O'Farrel Company et al were reported planning to commence another well on the Miles land, in Survey 143, McMullen County. The operators topped Mirando sand at 968 feet and found an excellent oil show in the first well. Attempts to complete failed and the well was quit at 1514 feet.

Texas Gulf Coast

Buttermilk Slough is new gas field for district.

Potential pool opener to set pipe and drill deeper.

Kelsey test indicates Vicksburg production

Mission.—Humble Oil & Refining Company turned the heat on South Texas Vicksburg trend when its first deep well within Kelsey field of Jim Hogg and Brooks counties showed for an excellent producer in the Jackson formation at 6099-6107 feet. McGill 5, bottomed at 6145 feet in shale, is awaiting orders. On a drill stem test the well recovered 560 feet of oil, no water, and 75 pounds pressure in 20 minutes. The test was through ¼ and ⅜-inch chokes. The well previously had shown for a gas well in the field sand at 4690-4712 feet, in the Frio zone, and again for a gas well at 4947-55 feet, apparently in the Vicksburg formation. While no definite information has been released, it is generally understood that the sand corresponds to the Government Wells level productive in the Mirando district.

At Sun field, Starr County, Sun Oil Company's development program netted another sand, this time a distillate producer. Olivarez 2 flowed at the rate of 40 barrels of distillate per day through ⅛-inch choke under 1800 pounds working pressure and showed considerable gas. The well had been drilled to 5650 feet but was plugged back and completed through perforations at 4129-35 feet, where 20 shots were made.

Fohs Oil Company recompleted a wildcat on the downthrown side of the Samfordyce fault in Hidalgo County, the well making 76 barrels on a 24-hour gauge through 10/64-inch choke, with 1100 pounds working pressure on tubing and 1410 pounds on casing. Production was from perforations at 3428-36 feet, the hole being bottomed at 3465 feet.

Houston.—The most closely watched wildcat in the Texas Gulf Coast, Wynn Crosby's Wilson 1, which has indicated a new field south of Algoa in Brazoria County, was down to 9020 feet last week after running an electrical log to 9012 feet and coring a sand with a show of oil and gas from 8838 to 8885 feet in Frio formation and also from 8819 to 8826 feet. Crosby will set a string of protection pipe. He may carry the wildcat to 10,000 feet.

New Gas Field

Sun Oil Company's Cavallin 1, Buttermilk Slough area, Matagorda County, came in last week flowing gas, distillate and salt water to open a new gas field for the Texas Gulf Coast. However, Sun has killed the wildcat to test another sand which indicated it would produce oil on an electrical log. Cavallin 1 was perforated with 25 shots at 9300 to 9318 feet and it came in flowing through a ⅛-inch choke with a tubing pressure of 2200 pounds and a casing pressure of 1975 pounds. The wildcat is four miles west of Palacios field, Matagorda County.

Northwest of Sandy Point, Brazoria County, Hamman Exploration Company's Darrington State Farms 1 was coring ahead below 6775 feet at the close of the week. It is understood that the wildcat has cored some promising sands up the hole. Several electrical surveys have been made and the operators have purchased additional acreage in the area at $100 per acre.

Fairbanks Active

Fairbanks field, Harris County, is the most active field in the Texas Gulf Coast. Last week there were 10 oil wells completed and a number more were on the producing sands ready for completion. Attention is being centered on the northeast side, where Union Producing Company is testing Murphy 1. Last week the well was perforated with 40 shots from 7020 to 7030 feet in a new sand and came in flowing oil at the rate of 360 barrels daily, 15 percent water, on a four hour test. Operators will squeeze the perforations and perforate a little higher to shut off the water. Northeast of Murphy 1, Kirby Petroleum Company is preparing to make another test on Daniel 1 in the new sand logged by Union Producing Company. A test at 7020 feet in Daniel 1 showed gas

Eureka Outpost Abandoned

Three thousand feet west of production at Eureka field, Harris County, Tide Water Associated Oil Company abandoned Roy 2 at 8090 feet after running an electric log. The well cored broken sands with odors of oil and gas and salt water at 8050 to 8070 feet.

Phillips Petroleum Company's Stewart Title 1, League City, Galveston County, was preparing to perforate casing to test a new sand found below 10,300 feet.

Navarro Oil Company will probably abandon Koch 1 in the Winnie area, Jefferson County. No shows of oil have been reported in the wildcat, a salt water sand was logged at 8265 feet.

Texas Gulf Coast Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Bammel—		
H. M. Harrell, J. Ehrhardt 1-A	*	6965
Batson—		
Seaport Oil Co., Jordan 1	481	5550
Boling—		
Mackhank Oil Co., Farmer C-11	*	6281
Dickinson—		
Bennett Oil Co., Thayer 2	600	8790
Humble, M. Stewart A-26	120	8525
Esperson—		
General Crude, Burgess 1	*	8215
Eureka—		
J. W. Frazier, Shady Acres 1	634	7718
Tide Water, Roy 2	*	8090
Fairbanks—		
Amerada-Stanolind, Adell 2	174	6854
Day 4	168	6854
Mills 10	180	6856
Smith 4	120	6850
Spaulding 3-A	120	6845
White 5	146	6852
Bridwell Oil Co., Gibson 5	85	6860
Gem Oil Co., Reid 1	124	6845
Housh & Thompson, Abraham 1	157	6847
Owenby-Smith, White 3	154	6848
Friendswood—		
Humble, Kiesling & Dixon 13	624	6040
West Production Co., 9	576	6042
West Fee 10-B	579	6049
West Fee 16-B	600	6040
Hardin—		
Humble, Partlow 9-A	432	7580
Hastings—		
Stanolind, Fee 1	616	6080
Old Ocean—		
Harrison & Abercrombie, Armstrong 3	350	10,535
Orange—		
Gulf, Laflour 2-B	141	5800
Red Bank, A. Chesson 1	123	5980
Tomball—		
Humble, Schultz B-3	759	5592
Van Vleck—		
Skelly, Moore 5	139	8249
Withers—		
Texas Co., Thompson 2-B	229	5547
Pierce Estate C-57	¶1	5696
Austin County—		
Hranicky et al, Fee 1, nw of Wallis, J. Stevens sur	*	1320

* Failures; † Junked; ¶ Million cu. ft. gas.

PETROGRAPHIC AND PHYSICAL CHARACTERISTICS OF SANDS FROM SEVEN GULF COAST PRODUCING HORIZONS

By M. T. HALBOUTY, B.S., M.S., Merit Oil Corp.

The material printed in this book was first published in The OIL WEEKLY in a number of installments, extending over a seven-week period. Because of the widespread interest and demand for copies, it is being presented in book form for the benefit of those who may wish to study or continue the research work of M. T. Halbouty, the author.

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Germany lacks oil

[Continued from page 92]

Little is known about the exact make-up of the Roumanian oil industry, but most recent figures indicate that, on basis of capitalization, the Roumanian share is approximately 30 percent, followed by the Anglo-Dutch with 36 percent, French with 16 percent and American with 10½ percent. Principal American-financed companies operating in the country are Romano-Americana, a subsidiary of Standard Oil Company of New Jersey; Refoil, and Photogen, the latter controlled by Socony-Vacuum Oil Company.

There is considerable uncertainty as to the future of the foreign oil companies in Roumania, which will depend largely upon whether German influence is exerted upon the Roumanian government to nationalize the petroleum industry.

German imports of petroleum products from Roumania were less in 1937 than in 1936. No figures have been made available to Washington as yet for 1938. Whether they can be increased to a point where they will meet her needs is doubtful; to some extent, it depends upon what kind of a trade can be made, since German imports have been restricted, not because of lessened needs but because of lack of exchange. It was the latter factor which cut her imports from the United States.

Latest available figures place German consumption at 5,150,000 metric tons of oil products, and her domestic production, much from hydrogenation of coal, at 1,850,000 tons, or 35.9 percent. However, it is indicated by reports to Washington, domestic production accounts for 1,230,000 tons, or 52.5 percent, of the 2,345,000 tons of gasoline consumed, and 320,000 tons, or 40.5 percent, of the 791,000 tons of fuel oil. On the other hand, she produces domestically only 120,000 tons, or 8.7 percent, of the 1,385,000 tons of Diesel oil she needs, and 140,000 tons, or 25.9 percent, of the 540,000 tons of lubricants.

Recently compiled statistics show the extent to which imports from Roumania fill German needs. Including receipts into Austria and Sudetenland from the time of their acquisition, Germany's imports of crude oil last year were 5,418,000 barrels, of which Roumania provided only 158,000, the bulk coming from the United States, 1,469,000; Mexico, 1,365,000, and Venezuela, 1,896,000.

Of 11,535,000 barrels of gasoline imported, Roumania furnished 2,746,000 barrels; of 172,000 barrels of kerosene, 67,000 barrels, and of 10,640,000 barrels of gas oil and motor oil, 469,000 barrels.

Roumania furnished only 63,000 of the 2,716,000 barrels of lubricating and transformer oils imported, 133,000 of the 2,702,000 barrels of fuel oil, and 549,000 pounds of the 20,980,000 pounds of crude paraffin.

It would appear, therefore, according to officials following the situation, that while Germany has of course improved her situation in oils, she has by no means become independent of imports from other countries, and cannot become so unless and until there has been a very material expansion of Roumanian production.

Effect of German trade rupture on oil unknown

Action of the United States government in suspending the reciprocal trade agreement with Czechoslovakia and ordering the imposition of countervailing duties on all imports from Germany, following the seizure of Czechoslovakia by that country, is expected in Washington to bring trade with Germany practically to a standstill.

Pending definite action by the German government to bar American products, however, officials were unable to estimate how badly United States export trade might be cut, but pointed out that shipments of petroleum and its products might be seriously reduced.

Figures compiled this week by the Department of Commerce show that exports of crude petroleum to Germany last year amounted to 1,287,000 barrels valued at $1,847,000, compared with 1,430,000 barrels valued at $2,004,000 in 1937. Exports of natural gasoline were 52,000 barrels valued at $193,000, compared with 63,000 barrels valued at $165,000 the previous year, and shipments of motor fuel were 2,253,000 barrels valued at $7,049,000, against 990,000 barrels valued at $3,251,000.

Other exports included naphtha, solvents, etc., 102,000 barrels in 1938, against 126,000 barrels in 1937; gas oil and distillate fuel oil, 3,953,000 barrels, valued at $6,251,000, against 2,690,000 barrels valued at $4,438,000; lubricating oil, $9,010,000, against $10,035,000; lubricating greases, 1,875,000 pounds, valued at $82,000, against 4,960,000 pounds, valued at $4,541,000; paraffin wax, $110,000, against $1,124,000; and asphalt and bitumen, $76,000, against $140,000.

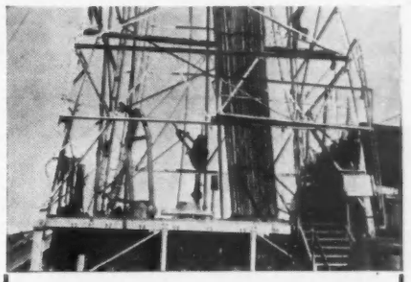
While Germany is seen as resenting Washington's action, it is not believed she can do much more than to indicate her displeasure. It is pointed out that she has curtailed her imports from the United States to the greatest possible extent, and that she buys here only those commodities she must have.

Accordingly, it is believed Germany will continue to purchase American oil products rather than cut this country off her list and leave herself at the mercy of other nations freed from the price competition of the American oils.

Asks dumping duties on oil imports from United States

Alberta Petroleum Association, acting on behalf of west Canadian oil operators, has made formal application to the Canadian government to impose dumping duties to keep distress American crude from entering the Canadian market. The application was signed by Herbert Greenfield, Calgary operator and association president.

According to informed circles at Ottawa, there is little likelihood that dumping duties will be imposed on crude oil in view of the present government opposition to use of such measures. Such duties have, however, been applied at times on products other than oil.



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South Louisiana

St. Bernard Parish wildcat may usher in new field. Perry Scranton finds new oil sand at Charenton.

Lake Charles. — Preparations under way to perforate between 11,200 and 11,220 feet in Vendome Petroleum Company's Kennelworth 1, northeast of St. Bernard in St. Bernard Parish, indicate possibility of another 11,000-foot producing field for the southern part of the state and the first for the parish. If the test fails at that level, higher horizons which have shown oil will be tested. Seven-inch casing rests at 11,469 feet.

Pomo Petroleum Company's Sentell 1, northeast of the discovery well at Eola field, Avoyelles Parish, soon will start coring for the Wilcox formation. Last week the hole was bottomed at 7609 feet in shale after coring Sparta sands. From 7487 to 7497 feet, four feet of sand and shale with an odor and cut of oil were cored. Soft sand showing oil was cored from 7505 to 7515 feet. Between the above well and the discovery well, Sid Richardson's Haas Investment Company 2 was completed. No gauge has been reported. This well was drilled to 8661 feet and cored a broken sand which showed oil, gas and salt water at 8632 feet. Five and half-inch casing was set at 8614 feet. The well was tested in Wilcox sands from 8463 to 8570 feet. Southwest of the discovery well, Sid Richardson's Haas Investment Company 3 also has been completed, but no official gauge has been announced. The well logged Wilcox oil sands from 8469 to 8576 feet with the hole bottomed at 8576 feet. Five and half-inch casing was set at 8556 feet.

Finds New Sand

A new oil sand was discovered at Charenton field, St. Mary Parish, last week by P. Scranton's Bayou Crue 1, east flank test. The well flowed 24 barrels per hour through a quarter-inch choke, with a tubing pressure of 1000 pounds and a casing pressure of 850 pounds, from Miocene sands at 7880 feet.

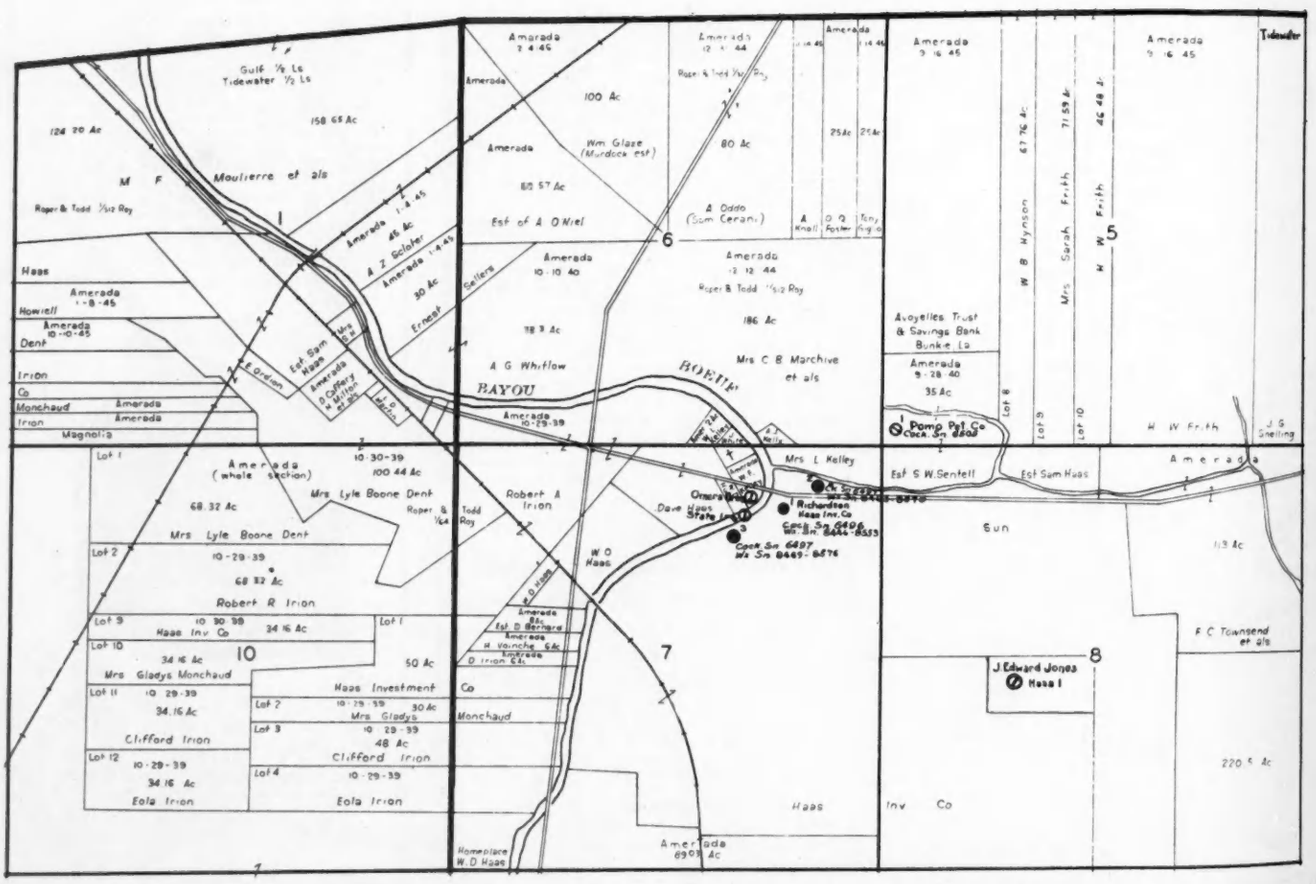
The world's deepest producing oil field will receive another test by Fohs Oil Company. The operators have made location for C. W. Buckley 1, 1¾ miles northwest of the discovery well at De-Large, Terrebonne Parish. It is 687 feet north and 3300 feet west of the northwest corner of Section 77-19s-17e, being in Section 25-19s-17e. Contract has been let to Loffland Brothers of Tulsa for a 12,000-foot test. The discovery well was completed at 13,254 to 13,266 feet. C. W. Buckley 1 may be carried to 13,266 feet or deeper. Material is being barged in to the location.

Humble Oil & Refining Company's School Land 2, Chalkley area, Cameron Parish, was preparing to make a production test at the end of the week after logging oil sands from 8659 to 8669 feet, 8848 to 8851 feet and from 8865 to 8871 feet, all new sands. The hole is bottomed at 8900 feet, where seven-inch casing was set. Humble's

South Louisiana Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Baton Rouge—		
William Helis, Duplantier 5	149	6475
Bayou Des Allemands—		
Amerada, St. Charles Land 3	*	9453
Caillou Island—		
Texas Co., State 54	421	4074
Charenton—		
Edmont Oil Co., Blanchard 2	10	1148
East Hackberry—		
Union Sulphur, Watkins 45	55	3080
Jennings—		
Glassel & Glassel, McFarlain 5	498	7268
Villa Platte—		
Continental, Vidrinne DeVille 3	215	9053
Assumption Parish—		
Humble, Milliken & Farwell 1, Labedieville area, 15-14s-14e	*	11,920

* Failures; † Junked; ¶ Million cu. ft. gas.



Eola, Avoyelles Parish, the first Wilcox production in South Louisiana, is taking on the appearance of a first class oil field. Sid Richardson has completed three wells and Pomo Petroleum Company's Sentell 1, northeast of production, has logged oil sands in Cockfield and Sparta formation and is running only a few feet lower than other wells. J. Edward Jones' Haas 1, southeast of production, is expected to be a producer and extend the field several thousand feet.

first oil well was completed at 8560 feet and the second was at 8950 feet. Shell Petroleum Corporation has made its first location at Chalkley. Hanszen 1 is 990 feet north of the south line and 990 feet east of the west line of Section 15-12s-6w.

Union Sulphur Company has made location for a wildcat six miles northeast of Sweet Lake oil field in Cameron Parish. Sweet Lake Land & Oil Company 1 is 330 feet south and 330 feet east of the northwest corner of Section 9-12s-7w.

It is reported that The California Company has made location in the Bannister area of Beauregard Parish for Long Bell Lumber Company 1 on a recently acquired block of 10,000 acres. No foot measurements have been given out on the location.

Continental Oil Company's second well at South Roanoke, Jefferson Davis Parish, was down to the sand discovered by the operator's first well. Sturdivant 2 was installing blowout preventer after setting 9⅝-inch casing at 9825 feet. The discovery well for the new sand was completed at 9880 feet. However, Sturdivant 2 may be carried to the 10,000-foot sand found by Union Sulphur Company some time ago.

On the flank of New Iberia field, Iberia Parish, The Texas Company's Renaudet 1 was drilling in shale at 9000 feet at the close of the week after coring another broken show of oil around 8913 to 8923 feet; 9⅝-inch casing set at 8339 feet is set just below another show of oil.

Louisiana permits

Shreveport, La.—Eight drilling permits were issued last week by the Louisiana Conservation Commission of which four were in North Louisiana, three in Caddo and one in Webster. The four in South Louisiana were divided between one in Acadia Parish and three in Rapides.

North Dakota geologist reviews deep failure

Bismark, N. D.—The California Company's Nels Kamp 1, first deep test to be drilled in North Dakota and abandoned last year at 10,281 feet, revealed neither oil nor gas, according to State Geologist Frank C. Foley, who examined the company's log filed last week in accordance with the state law requiring drillers to submit a record of all formations penetrated within six months after work is stopped. The test was made 16 miles southeast of Ray, on the Nesson Valley anticline, southeastern Williams County.

Formations below 6561 feet are different from what might have been expected from geologic sections exposed in the Black Hills of South Dakota and other areas, Foley said. Rocks penetrated were sedimentary and consisted of shale, limestone, dolomite, sandstone, anhydrite and salt. A total thickness of several hundred feet of beds of which salt formed a major part were found.

"Careful study by several geologists has failed to establish the ages of the rocks in the new horizons penetrated," he said. "Though the exact correlation of the rocks at the bottom of the well was not possible, it is probable that there is still a considerable thickness of sedimentary rocks between the bottom of the hole and the granite basement."

After drilling two summers, the wildcat suffered a stuck drill pipe on August 14, 1938, and efforts during the following two weeks to release the pipe were unsuccessful. Five shots of explosive separated the pipe at 7511 feet, and pipe was recovered. The test was abandoned on September 16, 1938.

Foley reported the well's log as follows:

Surface to 10 feet, recent river valley deposits, clay, shells, some lignite; 100 to 850 feet, Fort Union and Lance shale, sandstone and lignite; 850 to 1030 feet, Fox Hills, sandstone, shale, some lignite; 1030 to 3450 feet, Pierre, mostly shale, some sandstone; 3450 to 3580 feet, Niobrara, shale and limy shale; 3580 to 4165 feet, Benton, shale; 4165 to 4645 feet, Dakota Group, sandy shale, some sandstone; 4645 to 4830 feet, Morrison, gray and greenish shale; 4830 to 5585 feet, Ellis-Sundance, dark gray or greenish shale, some sandstone; 5585 to 6485 feet, Spearfish, mostly red shale, some sandstone and salt which appears first at 6020 feet; 6485 to 6561 feet, Minnekahta, dolomite.

Formations below 6561 feet are not definitely determined, Foley reported. Rocks are of the same general type found above that depth, and an unexpected section of shale and anhydrite was encountered between 7330 and 7710 feet. The 380-foot section contained many beds of salt. From 8130 feet to bottom at 10,281 feet, formation was mostly limestone.

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North Louisiana Fields

Shreveport and Cotton Valley continue most active areas. Natchitoches Parish wildcat will be tested with pump.

Shreveport. — Six locations were made last week in the Shreveport field which had 1 completion, its fifteenth oil well, and this area took the lead for activity in North Louisiana now having 17 active operations. W. C. Leisk's T. G. Sinclair 1, NW SE 26-18n-14w, between the producing areas of the field one mile apart, is showing some salt water with the oil coming from basal Glen Rose lime. Total depth is 5567 feet. The well completed last week was Henry Fotiades' Tomlinson 1, Section 35-18n-14w.

Average bottom-hole pressure in the Shreveport field was given as 1994 pounds in the March allowable order received last week by the Shreveport office of the Louisiana Conservation Commission from Commissioner William G. Rankin, which gave individual allowables to each of the field's wells. A total of 502.7 acres was listed as proven acreage of the field and the total acre pounds were given at 994,889, the daily allowable for a per acre pound being .00380 barrel.

The Shreveport field is only one operation ahead of the Cotton Valley field, Webster Parish, with 16 active operations. During the last week Cotton Valley added its largest Holloway sand (Travis Peak) oil well when Hunt Oil Company's R. D. Webb 6, C NW SE 14-21n-10w, was completed at 5943 feet, flowing 88½ barrels per hour through ¾-inch choke with casing pressure 1200 pounds and tubing pressure 700 pounds. Casing was cemented at 5655 feet and the Holloway sand was logged from 5670-96 feet and from 5803-18 feet. Three new locations were made in Cotton Valley last week, one of the three being on the north side of production, Hassie Hunt's Hodges 1, SE SE 11-21n-10w.

The lenticular Tokio horizon in the Vivian end of the old Pine Island field in Caddo Parish, had one of its "up" weeks adding 2 producers out of three completions and inspiring staking of 5 locations. The horizon is from 2450 to 2500 feet.

Jack F. Lent's E. L. Whatley 1, SW SE SW 17-10n-10w, Natchitoches Parish wildcat near Ajax, continued to swab in the Paluxy where 135 feet of oil had shown from 3280-96 feet. The well made several heads but refused to flow and probably will be standardized as about 500 feet of oil rises in the hole overnight.

George Ellis and Associates were ready to drill plug and test Walker 1, NW NW SE 8-4n-12w, south Sabine Parish, below the Angelina-Caldwell Flexure, that logged an oil showing in the Wilcox. Revised total depth is 2265 feet and 7-inch casing was cemented at 2255 feet. Three feet of sand showing oil was logged.

Triangle Drilling Company's Sandidge 1, SW SW 14-17n-12w, one mile west of 3100-3200-foot production at Sligo, Bossier Parish, after testing dry at 3220 feet, drilled ahead at 3825 feet. Arkansas-Louisiana Gas Company's Gayoso 2, C SW SE 14-16n-10w, Bienville Parish, drilling to lower Marine, was drilling at 7006 feet in sand and shale. Union Producing Company's Walker Unit 1, C SE 30-18n-8w, Webster Parish deep test at Dubberly, was drilling hard sandy shale at 8552 feet.

Magnolia Petroleum Company's Roseberry Unit 1, C SE 29-23n-9w, looming as the third lower Marine gas/distillate well at Shongaloo, Webster Parish, was running 5-inch casing to 9315 feet; total depth is 9376 feet. A fair gas/distillate saturation was logged from 9314 to 9361 feet.

W. N. Woods and associates have assembled a 10,000-acre block around Section 21-10n-9w, Natchitoches Parish, for a proposed 5000-foot test to spud by May 15. Roy Raines and associates have a 4500-acre block in the same parish around Section 26-9n-11w.

H. L. Hunt and Seaboard Oil Corporation jointly continue to take new unitized leases in the Bear Creek district, Bienville Parish, with a proviso of starting a basal Glen Rose lime (Pettet) test by July 20, provided enough acreage can be secured. They have 5000 acres in this area. Magnolia Petroleum Company and Ohio Oil Company have 1000 acres, T. L. James and Company about 800 acres and Mid-Continent Petroleum Company, 300 acres. These lease holders have agreed to an assessment of $10 per acre if Hunt and Seaboard will decide to drill two tests instead of only one.

Superior Oil Company of Oklahoma has been taking some leases recently in township 12 north, range 16 west, DeSoto Parish, in the same township and range where William Bridges has been securing leases.

Long-Bell Lumber Company has let Tide Water Associated Oil Company have six months geophysical option on 35,000 acres in townships 2 and 3 north, ranges 2 and 3 west, Rapides Parish. In Winn Parish, Continental Oil Company has a gravimeter unit working in townships 12 and 13 north, ranges 4 and 5 west near Dodson.

North Louisiana Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Caddo (Shreveport)—		
Harry Fotiades, Tomlinson 1, 35-18n-14w	660	5594
Caddo (Pine Island-Vivian)—		
J. P. Adams, Stallcup 1, 34-22n-16w	300	2468
Holcomb & Browning, Henderson 1, 27-22n-16w	75	2496
Tippett Oil Co., Stallcup 1, 34-22n-16w	300	2481
Thigpen-Herold 1, 34-22n-16w..	*	2501
Sabine (Zwolle)—		
Major Oil Co., Long-Bell 1, 11-7n-13w	10	2585
D. N. Jolley et al, Sumner 1, 14-7n-13w	*	2632
Sutton-Zwolle Oil Co., Bowman-Hicks 2, 23-7n-14w	*	2524
Webster (Cotton Valley)—		
H. L. Hunt, Webb 6, 14-21n-10w..	2125	5943

* Failures; † Junked; ¶ Million cu. ft. gas.

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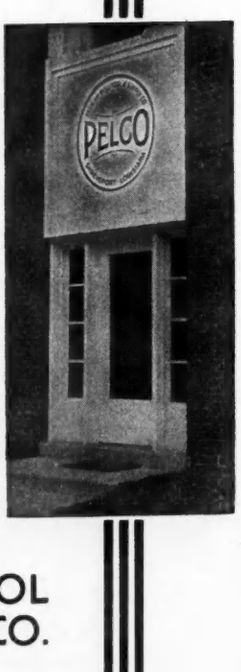
Buying stuff for drilling and producing oil wells is not like buying spuds or goobers or corn. Price is not the only consideration. You can't set up a store in a busy field and expect customers to flock in because of your shiny new merchandise. If they come at all, they have their own reasons for coming, and they're darned good reasons. Clever people, these oil men!



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New Iberia—Monroe
Cotton Valley—Greggton
Magnolia—Houston

Baton Rouge, La. — The Louisiana Minerals Board will receive bids at 11 a.m., April 4, on approximately 100,000 acres of state-owned land in thirty-six areas in the state. The bids will be received at the state capitol in Baton Rouge.

Arkansas Fields

Two more completions in Kerr-Lynn field

El Dorado, Ark.—The fourteenth and fifteenth oil wells were added last week in the Magnolia (Kerr-Lynn) field, Columbia County. One of them still remained ungauged as it flowed into pits. Still cleaning itself, Atlantic Refining Company's Crisp 1, Section 23-17-20, was flowing Thursday 108 barrels per hour through ½-inch choke with tubing pressure 1300 pounds and casing pressure 900 pounds. Total depth is 7599 feet and casing was perforated from 7517 to 7587 feet. The well flowing ungauged into pits is Normandie Oil Company's Levi Garret B-1, Section 13-17-20. One test drilled in the Buckner field and two drilled in the Village field, both Permian lime oil fields in Columbia County.

Atlantic Refining Company, which recently took option on E½ 16-18-22, Columbia County, near Experiment, for a proposed Permian lime test, last week made location for Pine Woods Lumber Company 1, C NE NE 16-18-22. Drilling must start by June 1 and meantime larger lease owners around Experiment are being asked to contribute $20 per acre to drill the Permian lime wildcat. Lease owners in this area include: Gulf Refining Company, Hunt Oil Company, Lion Oil Refining Company, Magnolia Petroleum Company, Mid-Continent Petroleum Company, O'Brien Brothers, Standard Oil Company of Louisiana, Sun Oil Company, Superior Oil Company, and Tide Water-Seaboard.

Atlantic Refining Company in recent months has leased extensively near Macedonia in Columbia County. Just east of Waldo in the same county, J. K. Lafferty and associates have recently leased 700 acres around Section 15-16-21 and Lion Oil Refining Company and Root Petroleum Company are leasing in the same township.

Some leasing is still going on in LaFayette County, despite two recently abandoned deep wildcat tests. Hunt Oil Company leased 120 acres in Sections 17 and 18-17-23 and south of Lewisville, Lion Oil Refining Company leased 200 acres in Sections 14, 26 and 36-17-23. Ohio Oil Company leased the 320-acre McFarlane Estate tract in Sections 24 and 25-16-24.

In Lincoln County, 10 miles south of Star City, H. L. Halverson and associates have leased 10,000 acres centering around Section 32-10s-7w, agreeing to start a 5000-foot test by May 1. Lion Oil Refining Company has gone into township 15, range 27, Miller County, to secure 200 acres in Sections 20, 22 and 34-15-27, J. K. Wadley having been active some time in leasing in this township and range.

In Ashley County, southeast Arkansas, Howard W. Morris of Chicago who two years ago assembled a 10,000-acre block in that county around Section 19-19s-4w, is now trying to assemble a 20,000-acre block in that same area for a Permian lime test to start within six months.

In Union County east of El Dorado and in the Rainbow City (Champagnolle) area Sam Sklar leased 240 acres in Section 14-17-14 for a 3500-foot test, which would be outside producing limits at Rainbow City. The test will start immediately.

Judge White and associates of Searcy have assembled 60,000 acres in township 6 north, range 5 west near Bradford, White County, ten-year leases but carrying a proviso to drill a 2500-foot test.

Arkansas Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Union County (Smackover)—		
Hollyfield & McFarlane, S. Murphy 7, 9-16-15	65	2343
Sam Sklar, Tr., Murphy 10, 9-16-15	35	2330

* Failures; † Junked; ¶ Million cu. ft. gas.

Mississippi lease

Jackson, Miss.—The Mississippi State Mineral Lease Commission received new bids Thursday, March 23, at Jackson, for estimated 780,000 acres in Mississippi Sound (part of the Gulf of Mexico) for mineral development. Three bids were offered: Phillips Petroleum Company offered cash payment of $61,200 and $200,000 over-riding payment on each producing structure; Ernest Cockrell and B. B. Jones offered $60,000 bonus and $1,000,000 over-riding payment over the entire area; and Westbrook, Thompson and Stewart, who offered $50,000 cash bonus and agreed to all terms specified by the commission.

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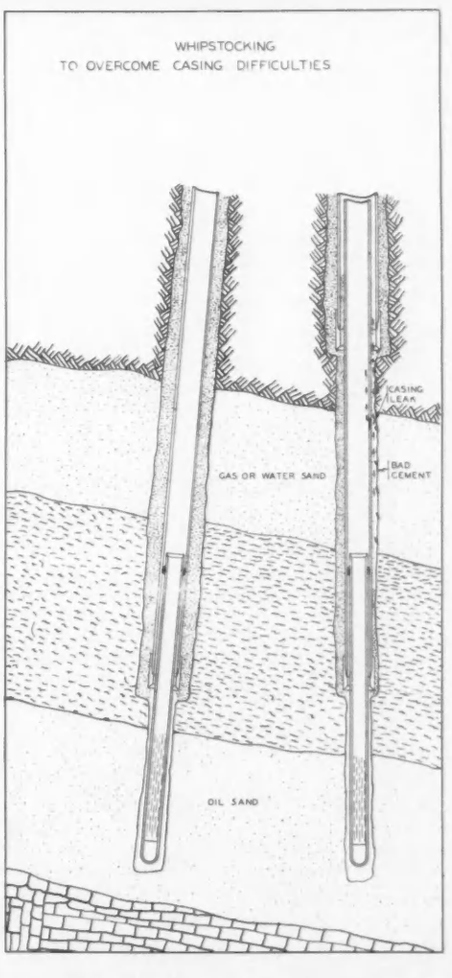

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New Mexico Fields

Outpost producers in two areas will require offsetting.

Fourth well in prospect in newly opened Lovington area.

Hobbs, N. M.—Outpost tests in the Hardy sandy-lime area and the Vacuum field, Lea County, proved to be outstanding completions the past week, with each requiring 3 offsets. The county added 6 new operations during the 7-day period.

Magnolia Petroleum Company's Rosa Marshall 1, C SE NW 34-21s-37e, east of the Eunice townsite sector of the Hardy field, flowed 66 barrels of oil the first hour through 7/16-inch choke and 50 barrels the second hour on 5/16-inch choke after dislodging bridge. It was shot with 160 quarts of nitro at 3670-3750 feet. Two previous completions by the company on separate leases due west of the new well also made above the average producers. Gulf Oil Corporation's Carson 1-C, C NE NE 33-21s-37e, has rigged up to offset the first of the trio.

Magnolia Petroleum Company's State 1-P, C SW SE 22-17s-35e, half mile from nearest production in the northeast portion of the Vacuum field, gauged 743 barrels of oil natural in 24 hours through ½-inch tubing choke. Three pay zones were logged between 4285 feet and 4640 feet, with an elevation of 3944 feet. This test was considered doubtful for production because of the close proximity of a structurally low dry hole to the northwest. Rig was skidded one location to the east to drill State 2-P before production test was made of the outpost. Continental Oil Company's State 5-H-35, C SW NE 35-17s-34e, an inside location, gauged 48 barrels of 38.5 gravity oil per hour natural for 3 hours on ¾-inch choke from pay at 4460-4675 feet.

Repollo Oil Company's State 2-197, half mile north of the company's isolated producer on a northwest trend from the Vacuum field, encountered salt and sulphur water in deepening to 5020 feet. This checked about level structurally with the discovery, but no porosity of any consequence was present in the projected pay zone.

Revised proration schedule for the March 16-31 period raised the top allowable of wells in Eddy County, and the Maljamar pool, Lea County, 2 barrels to 83 barrels daily. This increase was made primarily on the strength of the New Mexico Pipe Line Company boosting its nominations to 1300 barrels daily. Only 66 wells in the above areas can produce the maximum allocation, leaving the remainder without production restrictions. The production includes 5000 barrels daily being consigned to a refinery in Italy. No change was made in the mid-month schedule for Lea County, which has a top allowable of 54 barrels daily. Actual production is considerably lower in some Lea County fields because of pipe line proration.

More development is in store for the southwest edge of the Monument field as result of the showing made by Continental Oil Company et al's Sanderson 4-B-14, NE SW NW 14-20s-36e, which gauged 65 barrels of 34.5° oil per hour on 3-hour test through ¾-inch choke after using 1000 gallons of acid in pay at 3800-3827 feet. The partnership has cemented surface pipe for Britt 5-B-15, near C W½ NE NW 15-20s-37e, east outpost for the field. Stanolind Oil & Gas Company's Gilluly 4-B, NW NW NW 22-20s-37e, is also a new operation for the area.

Continental Oil Company's State 1-F-A-1, C W½ SE NE 1-22s-35e, west edge test for the Eunice field, tested a small amount of gas and no oil after 235-quart nitro shot at 3800-3900 feet. The hole is believed to have bridged. Sulphur water was encountered in drilling to 3949 feet, or 345 feet sub sea, and the hole was plugged back to 3910 feet. M. D. Bryant and Drilling & Exploration Company's State-Republic 3, near C S½ NW SE 12-21s-35e, is a new project for the west flank of the Eunice field.

In the Langlie sandy-lime area, Italo Petroleum Corporation of America has made location for Carlson 3-B-27, NE SE SE 27-25s-37e. This concern has been successful in drilling near old dry holes in the field. Amerada Petroleum Corporation and Cities Service Oil Company's Stuart 1-B, NW SE NE 22-25s-37e, is a late completion for the area, having gauged 72 barrels natural in 24 hours through 14/64-inch choke at 3380 feet.

The completion of a fourth oil producer for the Lovington pool, only strike in Lea County this year, appeared probable when Stanolind Oil & Gas Company's State 2, C SE NW 1-17s-36e, half mile north of production, cored oil saturation in broken lime at 4612-37 feet, with an elevation of 3840 feet. The test was trying to free stuck drill pipe at 4637 feet, according to late reports.

The Loco Hills pool, Eddy County area discovered last February, promises to become an important drilling center since the first two completions have produced above the average for the county, Franklin Petroleum Company's Ballard 1, NE NE SE 1-18s-29e, flowed 250 barrels oil in 3 hours through casing after 130-quart nitro shot in sandy-lime pay at 2780-2818 feet. It flowed by heads prior to being shot. Ballard 1 is west of Martin Yates et al's Yates 1, which uncovered the pool with a flow of 420 barrels oil in 18 hours after nitro shot in pay at 2808-2874 feet.

Shell Petroleum Corporation's Harwood 1, wildcat on the Milnesand structure, Roosevelt County, was logging anhydrite and shale in drilling at 7215 feet.

New Mexico Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Lea County (Langlie)—		
Gulf, Stuart 6, c nw nw 11-25s-37e	250	3430
Lea County (Mattix)—		
Continental et al, Jack 4-A-20, c sw ne 20-24s-37e	720	3580
Jack 2-B-27, c sw ne 27-24s-37e	720	3537
Weiner et al, Woolworth 2, sw nw sw 33-24s-37e	120	3565
Lea County (Monument)—		
Continental et al, Sanderson 4-B-14, ne sw nw 14-20s-36e	1560	3827
Lea County (Vacuum)—		
Continental, State 5-H-35, c sw ne 35-17s-34e	1152	4695
Magnolia, State 1-P, c sw se 22-17s-35e	743	4640
Phillips, State-Santa Fe 20, c sw sw 27-17s-35e	1098	4607
Repollo, State 2-197, se ne se 6-17s-34e	*	4020
McKinley County—		
Petroleum Prod. Co., Santa Fe 3, 1-17n-9w	206	1590

* Failures; † Junked; ¶ Million cu. ft. gas.

Rocky Mountain States

Will deepen Cole Creek discovery well to Sundance.

Lance Creek's Leo pool is extended quarter mile.

Casper, Wyo.—General Petroleum Corporation is rigging-up rotary equipment on the discovery well in the Lakota sand at Cole Creek, 13 miles northeast of here, Natrona County, to deepen for possible production in the Sundance sand. In State 2, NW NE SE 16-35n-77w, the company found high porosity and permeability in the Sundance which, however, carried no oil, and possibly was water bearing.

On a basis of the excellent sand condition in the Basal Sundance in State 1, company geologists are of the opinion that deepening to the Sundance at Government 1, NW NE SE 16-35n-77w, a mile south and located near the top of the structure, offers the best immediate possibilities.

State 1, second test at Cole Creek,

Mountain States Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
MONTANA		
Toole County (Kevin-Sunburst)—		
Sid Porter's Fee 1, se se se 3-34n-2w	30	1515
WYOMING		
Natrona County (Cole Creek)—		
General Petroleum Corp., State 1, nw ne se 16-35n-77w	*	8707
Niobrara County (Lance Creek)—		
Adams Oil & Gas Co. & Felmont Oil Corp., Baker 1, nw ne sw 8-35n-65w	185	5626
Continental Oil Co., Tom Bell 14, cnw sw 34-36n-65w	315	3974
COLORADO		
Moffat County (Hiawatha)—		
Mountain Fuel Supply Co., Florence Wilson 1, nw se ne 22-12n-100w (owd)	¶5	2606

* Failures; † Junked; ¶ Million cu. ft. gas.

has been plugged and abandoned after failure to develop commercial production in sands from the Wall Creek through the Dakota series to the Sundance, latter logged at 8639-8706 feet. Government 1 was completed the past June for 250 barrels at 7974-8013 feet, the Lakota formation. The hole bottoms seven feet in the Red Beds, with a total depth of 8020 feet. This would place the Sundance at around 8600-8700 feet at the Government 1 location.

Outpost Flows

Adams Oil & Gas Company and Felmount Oil Corporation's Baker 1, NW NE SW 8-35n-65w, given a final completion gauge of 185 barrels daily flowing production, extends limits of the Leo pool of the Lance Creek field a quarter mile south. The completion will cause about 16 additional locations on the south side of Lance Creek for drilling to the Leo. Depth of the well is 5626 feet, with saturation topped at 5606 feet. The well was treated with 4000 gallons of acid and then shot with 24 quarts of nitro-glycerin.

Immediately north, Continental Oil Company is digging cellar and pits and moving-in for Deilman 3-B, SW SE NW 8-35n-65w. J. E. Manning, Lance Creek operator, is moving-in to drill Government-Hewett 1, NW SW SW 4-35n-65w, an outside location on the southeast side of the field, but substantially within Leo proved contour as extended by the Adams-Felmount extension well and previous completions.

Minnelusa Oil Corporation's H. & M. 3 (was No. 1), on Lease 5, NW NE SE 7-35n-65w, a half mile west of the Adams-Felmount south extension, drilling at 4245 feet, is nearing critical depth.

Ohio Oil Company's Agnes Rohlff 3, NE NE 32-36n-65w, an old Sundance producer and an outside location on the north side of the field, is drilling red beds at 4566 feet deepening for the Leo from old total depth of 3956 feet. Mackinnie Oil & Drilling Company is running rig foundation for Thompson 5, SE SE NW 7-35n-65w, a first report on the south side of the field and another start resulting from the Adams-Felmount completion.

Seven miles east of Lance Creek, Dr. F. F. Hintze et al are at critical stage in Government-Wright 1, CNW SE 30-36n-63w, which is preparing for tests of upper sands at an unreported depth after testing water in the Sundance at 4941 feet, with total depth at 4964 feet. The well is reported to have encountered 27 feet of oil saturation in the Dakota, topped at 4235 feet.

To Deepen Discovery

Continental Oil Company's Delahoyde 1, CNL NE NE 25-37n-63w, discovery of Muddy sand production at 3945-3955 feet on Ant Hills structure, 14 miles northeast of Lance Creek, is rigging rotary to deepen to the Sundance and the Minnelusa series. Because of development of large yields in the deeper sands at Lance Creek, this test will mark one of the most interesting on the docket for 1939 Wyoming exploration.

Extension of Osage shallow light oil field a mile west appeared fairly certain this week as Wheedon et al's Government 1, CSW NE 21-46n-64w, recovered 50 feet of saturated section in cores of the Muddy sand from 3838-3888 feet. Well is waiting on cement to set around the 7-inch production casing landed on top of saturation. It is about 1½ miles southwest of the Federal Oil Company's Government 5, SEc 15-46n-64w, which was completed for 125 barrels initially and settled to around 60 barrels on the pump. The well indicates some 40 to 50 locations within possible producing limits for drilling.

A deep test of the lower Frontier section on the Dry Piney structure, Sublette County, southwestern Wyoming, The Texas Company and Frontier Petroleum Corporation's Government 1, SE SE SW 1-28n-114w, is at a critical stage, drilling plug in a seven-inch string set on bottom at 5607 feet preparatory to coring ahead in the Basal Frontier. Casing is set in a new hole, drilled after operators cemented the old hole at 6247 feet when continued gas blow-outs and threatened cratering from an estimated 40,000,000 cubic feet of gas daily from upper sands at around 700 feet precluded testing of the lower objective. In view of the large amount of gas encountered and similar gas flow on the Big Piney wildcat eight miles to the northeast, and because of the several large drilling blocks leased by major companies and seismically studied on a basin-ward trend from Dry Piney, this wildcat is considered the most important current test in the Rocky Mountain division.

W. C. (BILL) LEWIS has been made assistant manager of the land and drilling department of Bennett Oil Corporation.

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Michigan Fields

Bloomingdale, Columbia pools indicated as connecting. Freeman pool west flank completion has record for area.

Mt. Pleasant, Mich.—Connection between the Bloomingdale and Columbia pools, Van Buren County, was indicated this week when a test, mid-way between the 2-mile undeveloped "break," showed a hole full of oil before acid treatment. The important "link" test is being developed by Doc Thompson and Leo Fitchett at Summy et al 1, SE NE NE 12-1s-15w, Columbia Township. Six-inch casing was set at 1164 feet and at 1175 operators logged a hole full of oil. The test was shut down early this week waiting orders either to acidize or deepen.

If development on the Summy well and other tests link Columbia and Bloomingdale as a single producing pool, it would establish a productive area approximately seven miles long, east-west. This area is about 45 percent drilled up now.

Carscallen & Andersons' Longnecker 1, Section 4-7n-13w, Tallmadge Township wildcat, Ottawa County, went into the records this week as the first commercial producer in the county. The wildcat originally tested 12 barrels per day production at 1981 feet from Traverse limestone three months ago but was finally carried to 2374 feet for a Dundee lime test. This formation did not show commercially. After a shut down of several weeks, it was plugged back to the 1981-foot pay and acidized with 500 gallons. The test produced 115 barrels the first 12-hour test but was rated a 40- to 50-barrel pumper settled.

A record dry gas flow from the Berea sand was drilled this week by Crown Development Company, Johnson 1, Section 5-6n-12w, Wyoming Township, Kent County, which gauged 10,000,000 feet per day at 1070 feet. An attempt to shut the well in resulted in a blowout that lifted 60 feet of 8-inch casing out of the hole, letting Marshall water in on the gas pay. Later gas and water were killed. Operators plan to carry the test to the original 1900-foot Traverse lime objective.

Deepened 6 feet to 3880 feet, Basin Oil Company's Van Horn 4, SW NE NE 4-18n-6w, Clare County, a west flank well in the Freeman pool, hit a natural flow record for the district. The well, previously producing 450 barrels per day, jumped to 364 barrels per hour, and gauged 2160 barrels in 17 hours, partly beaned down, before it could be harnessed to meet the proration limit of 250 barrels.

Gulf Refining Company figured in on two of the week's important developments. Arthur-Hall 2, NW SE SW 34-19n-6w, Redding Township, Clare County, was successfully completed by the directional drill method as the first in the state. This well originally was drilled to 1776 feet with rotary and cased (6-inch) and completed to 3923 feet with cable tools. Operators were unsuccessful in producing the Monroe which cut about 99 percent water. The hole was plugged back to 2590 feet and rotary directional drilled back to 3921 feet, with the new lime penetration point approximately 169 feet southeast of the first. The new hole acidized into a 212-barrel production in 17½ hours, cutting from 5 to 15 percent water. Pinched to 110 barrels, operators said water cut was not a serious problem.

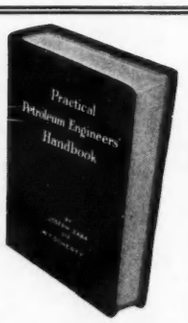
In Bay County, Gulf Refining Company reported a 90 percent water shutoff with chemical seal of a water sand at 3995 feet on Bateson 1, Section 2-14n-4e, projected 5000-foot test. Drilling was resumed. This test already has showed in Monroe at 3530 and Sylvania at 3955 feet.

Michigan Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Allegan County—		
Swanson Oil Co., Essink 4, se sw sw 22-4n-14w	150	1480
Stewart et al, Kruithof 1, sw ne nw 27-4n-14w	700	1461
Gordon & Wilson, Sutter 2, se nw nw 11-4n-13w	225	1614
Clare County—		
C. W. Teater, Van Horn 8, se sw ne 3-18n-6w	115	3895
Pure, Switzer A2, c n nw sw 27-19n-6w	270	3913
C. L. Maguire, Goldsmith 2, nw sw se 34-19n-6w	75	3896
Gulf, Hall 2, nw se sw 34-19n-6w	270	3921
Gladwin County—		
Sun, Tuckerman 1, c e ne ne 2-17n-2w	*	3990
Isabella County—		
Pure, Baker 5, sw sw nw 33-15n-6w	300	3654
Mecosta County—		
Gulf, Klienfelter 1, se nw se 22-15n-9w	*	1445
Ottawa County—		
Gordon Oil Co., Berg 1, nw ne ne 13-7n-16w	*	1715
Carscallen et al, Longnecker 1, se se se 4-7n-13w	45	1981
Van Buren County—		
Christ Shrock, Church Bros. 1, nw nw ne 26-2s-16w	*	....
Fisher & McCall, Melvin 2, nw se sw 8-1s-14w	400	1227
Melvin 3, ne se sw 8-1s-14w	800	1205
Howard Fowler, Melvin J3, nw sw se 8-1s-14w	315	1200
H. B. Cannon, Babcock 2, nw ne nw 17-1s-14w	200	1205
Rowe & Kernodles, West 1, ne ne ne 18-1s-14w	415	1225
Cryden et al, Knepper 1, ne nw se 10-1s-15w	*	1207

* Failures; † Junked; ¶ Million cu. ft. gas.

PRACTICAL PETROLEUM ENGINEERS' HANDBOOK



By JOSEPH ZABA, E. M. M. Sc.
Petroleum Engineer, Rio Bravo Oil Company
and
W. T. DOHERTY
Division Superintendent, Humble Oil & Refining Company

For a number of years there has been a growing demand for a handbook containing formulae and other practical information for the benefit of the man working in the production and drilling branches of the oil industry. So great has been this need that many engineers have tried to accumulate their own handbooks by clipping tables, formulae and figures from scores of sources.

The co-authors of this volume discovered by coincidence that each had been for a period of several years accumulating practical data which through their collaboration appears in this book. Both of them are men who have not only received theoretical training but who have had many years of practical experience as engineers in dealing with every day oil field drilling and production problems.

As a result of this collaboration of effort the publishers of this volume feel that it is a most valuable contribution to oil trade literature.

Its purposes are distinctly practical. The tables, formulae, and figures shown are practical rather than theoretical in nature. It should save the time of many a busy operator, engineer, superintendent, and foreman.

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Little change in federal oil tax collections

Collections from the federal gasoline and lubricating oil taxes in February continued practically at the level of the preceding month, but revenue from pipe-line transportation increased sharply, it was reported March 21 by the Internal Revenue Bureau.

Gasoline tax receipts for the month were $16,427,083 compared with $16,429,873 in January, and were nearly $3,000,000 above the February, 1938, total of $13,541,200, while revenues from the lubricating oil levy were $2,129,468 compared with $2,199,019 in the preceding month, and were $400,000 above the $1,775,446 reported for February of last year.

Pipe-line transportation revenues, the bureau announced, were $1,092,781, compared with $792,339 in January, and were practically at the level of February, 1938, when $1,094,979 was collected.

California Fields

Majors take large block north of Coalinga Nose.

Barnsdall-Newhall-Potrero area gets extension.

Los Angeles. — Shell Oil Company, Standard Oil Company of California, Seaboard Oil Company, Tide Water Associated Oil Company, Richfield Oil Corporation and Western Gulf Oil Company have taken a block of 8000 acres seven miles north of East Eocene (Coalinga Nose) pool of Fresno County with the reported intention of having the Shell organization do the drilling.

Most of the acreage around East Coalinga is controlled by the government and current development is carried on on the basis of one well to 40 acres.

Richfield Oil Corporation has decided to deepen KCL-1, an exploratory test in Section 28-11-20 of Wheeler Ridge field, to the Vedder zone. Last January this project was placed on production at 8765 feet, having previously been drilled to 9272 feet. It was good for 1800 barrels of 37.5-gravity oil and considerable water at the time, but eventually cleaned up to a point where it produced practically clean oil. Last week the well was producing at the rate of 86 barrels a day cutting 36 percent. The Vedder zone has been successfully developed at Ten Section and Greely fields.

Richfield has abandoned the wildcat in the Union Avenue area south of Bakersfield, due north of Wheeler Ridge. It failed to find a trace of oil down to 10,427 feet.

Extension of the Barnsdall-Newhall-Potrero producing area was accomplished last week when Barnsdall Oil Company brought in Rancho San Francisco 5, for an initial yield of 1200 barrels of 34.9-gravity oil per day from 7103 feet. The company's Rancho San Francisco 6 has been spudded in Section 26-4-17, Los Angeles County.

In the San Emigdio area, Kern County, Shell Oil Company is drilling a wildcat in the southwest corner of Section 32-11-22, a locality in which Continental Oil Company blocked up 2000 acres, although no immediate drilling is planned. Shell's project is five miles southeast of Midway-Sunset.

Another leasing play which may not result in new drilling immediately reveals the acquisition of considerable acreage five miles east of Fomosa, Kern County. Richfield Oil Corporation acquired Sections 11, 12, 13, 14, 24 and 25, while Tide Water Associated Oil Company, General Petroleum Corporation and The Texas Company have also taken protection acreage. It is possible that a joint test will be financed.

On acreage that was quit-claimed by a major oil company some months ago in the Arvin area, Kern County, the Universal Consolidated Oil Company has staked tentative location for Derby 1 in the W½ corner of Section 15-31-29. Drilling operations will get under way early in April. Derby 1 will offset Superior Oil Company's Jewett 1, Section 16-31-29, which is drilling below 5000 feet in shale, and is searching for the same production zone found several weeks ago in the Arvin discovery well, drilled by Superior, Standard Oil Company of California and The Texas Company.

California Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Los Angeles County (Athens-Rosecrans)—		
Barnsdall, Rosecrans 12	118	7668
(Dominguez)—		
Union, Callender 25	179	4795
(Montebello)—		
McVicar & Rood, Manz 1	800	7240
Union, Wilcox 3	262	6699
(Torrance Extension)—		
Texas Co., Oakley 4	244	5200
(Torrance)—		
Alford Oil Co., No. 14	1200	5187
C. C. M. O., Torrance 41	220	4922
Critton & Colvin, Clark 1	130	5168
Sunset Oil Co., La Salle 1	oil	5202
Vesta Pet. Co., Bruhn 1	800	5170
(Santa Monica)—		
Texas Co., Anderson-Spring 1, sec 9-2-15 (W)	*	7336
Orange County (Huntington Beach)—		
Southwest Exp. Co., State 9	306	4375
Kern County (Wasco-Semitropic)—		
Continental, KCL A-4-8, swc 8-27-24	9200	13,153
(Kern River)—		
Combs Bros., No. 1, c se 28-28-28	6	521
(Midway-Sunset)—		
Texas Co., No. 33, sec 32-32-24	66	3183
(Grapevine-Wheeler Ridge)—		
Tide Water, S. P. 2, 15-11-19 (W)	*	7326
(Round Mountain)—		
Trico Oil & Gas Co., Olcese 1, sec 17-28-29	*	1967
C. C. M. O., No. 1-31, 31-27-29	*	1027
(Union Avenue)—		
Richfield, Union Ave. 1 sw 6-30-28 (W)	*	10,427
Fresno County		
(East Coalinga Eocene)—		
Robert S. Lytle, No. 35-7F, ne sw 7-20-16	2848	7328
Ventura County (San Miguelito)—		
Continental, Grubb 10 sw 23-3-24	2600	7035
Santa Barbara County		
(Santa Maria Valley)—		
Geo. F. Getty, Vicente 8, nw 27-10-34	500	4982
E. H. Moore, Union Sugar 11, Section 24-10-35	289	4615

*Failures; †Junked; ¶Million cu. ft. gas.

Fundamentals of Petroleum

"Fundamentals of the Petroleum Industry," a 445-page book by Dorsey Hager, has been published and is ready for general distribution. Chapters include: Petroleum's Contribution to National Well-being; History and Romance of Oil; Individual Operators, Oil Companies, and Oil-field Workers; World Distribution of Oil; Petroleum Reserves; Acquiring Oil Lands and Royalties on Oil Lands; Engineering in the Search for Oil; Drilling for Oil; Drilling (continued); Production Methods — Well Completion; Production Methods—Well Spacing; Transportation and Storage; Refining of Oil; Marketing; The Business of Oil; Oil Securities; The Oil Industry and Legislation; Future Trends. More than 200 illustrations are used. Price of the book is $3.50, and can be had through the Book Department, The Gulf Publishing Company, Houston, Texas.

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WILDCAT REPORT
New Starts and Completions

STATE	WILDCATS STARTED		WILDCAT TESTS COMPLETED							
			Total		Oil		Gas		Dry	
	This Week	This Year	This Week	This Year	This Week	This Year	This Week	This Year	This Week	This Year
Alabama	...	1	...	1	...	...	...	...	...	1
Arkansas	1	7	...	5	...	...	...	...	...	5
California	8	63	3	26	...	8	...	...	3	18
Colorado	...	...	...	1	...	...	...	...	...	1
Florida	...	...	...	...	...	...	...	...	...	...
Georgia	...	1	...	...	...	...	...	...	...	...
Illinois	7	101	6	51	...	3	...	...	6	48
Indiana	...	7	...	1	...	...	...	...	...	1
Kansas	7	42	3	36	1	13	...	...	2	23
Kentucky	3	5	1	4	1	3	...	...	...	1
Louisiana	1	30	1	23	...	5	...	...	1	18
North Louisiana	...	11	...	8	...	2	...	...	...	6
South Louisiana	1	19	1	15	...	3	...	...	1	12
Michigan	5	45	4	71	1	7	...	...	3	64
Missouri	...	1	...	...	...	...	...	...	...	...
Montana	...	1	...	...	...	...	...	...	...	...
New Mexico	...	7	...	5	...	2	...	...	...	3
New York	...	...	...	2	...	...	...	1	...	1
Oklahoma	5	44	2	35	...	5	...	2	2	28
Ohio	1	1	...	3	...	1	...	...	...	2
South Dakota	...	1	...	...	...	...	...	...	...	...
Texas	20	208	25	229	4	26	1	2	20	201
East Texas	5	29	4	15	...	...	...	...	4	15
North Texas	5	24	5	56	2	15	...	1	3	40
Gulf Coast	1	25	1	18	...	2	...	...	1	16
Panhandle	...	2	...	1	...	...	...	...	...	1
South Texas	6	83	10	101	1	7	...	...	9	94
West Texas	3	45	5	38	1	2	1	1	3	35
Wyoming	...	2	...	1	...	...	...	...	...	1
Total U. S.	58	567	45	488	7	74	1	5	37	409

ARKANSAS

FIRST REPORTS

Columbia County — Atlantic et al's Pine Woods Lbr. Co. 1, c ne ne 16-18-22, lcn.

CALIFORNIA

FIRST REPORTS

Los Angeles County—Richfield's Montana Land 1, 200 ft s, 200 ft e Roosevelt Rd. and Cherry Ave. in 17-4-12, rig. Tide Water's Fernando 1, 642 ft e, 488 ft s Station 84 (nec Porter ppty), grade; Porter 3, 1655 ft w, 130 ft n Station 84, lcn; Porter 4, 2275 ft w, 300 ft n Station 84, grade; Porter 12, 535 ft w, 605 ft s Station 84, lcn.

Kern County—Atlas Pet. Co.'s Moore 1, 1000 ft s, 150 ft e nwc 7-25-25, lcn. Spartan Oil Co.'s No. 1, 175 ft s, 780 ft e n¼c 32-28-29, grade.

Santa Barbara County—Richfield's San Marcos 1, Section 20-6-29, lcn.

COMPLETIONS

Los Angeles County—Texas Co.'s Anderson-Spring 1, sw c 9-2-15, abnd 7336 ft; bottomed first hole in schist 7285 ft, top schist 7225 ft, redr to 7336 in gray sand, test 7290-7336 ft, recovered 6600 ft salt water.

Kern County—Tide Water's S. P. 2, nw 15-11-19, abnd 7326 ft, top Santa Margarita 4140 ft, tests 6533-6641, 6639-6714, 6641-6759, 7015-7153 ft, so&g. Richfield's Union Ave. 1, sw 6-30-28, abnd 10,427 ft, bottomed in lower Miocene, top Santa Margarita 5190 ft, top Wicker 6725 ft, barren, top barren Vedder 9665 ft, poor oil sand 4410-40 ft, trace oil 5197-5221 ft.

ILLINOIS

FIRST REPORTS

Macon County — Snake Hill Development Co.'s J. Dipper 1, ne se nw 17-16n-2e, dr.

Marion County—Kingwood Oil Co.'s Loomis 1, ne ne ne 31-3n-2e, loc.

Montgomery County—Independent Producing & Refining Co.'s Nieman 1, nw se sw 29-8n-5w, rig.

Randolph County — Tanner & Melbern's Miller Estate 1, sw ne 29-2s-7w, near New Athens, dr below surface pipe.

Wayne County—Roche & Voyles' Jewell 1, c e sw se 3-2s-7e, dr. Allen's Horton 1, se se se 12-3s-9e, Leech tnp, sp.

White County—Gene Shirley's Eastwood 1, se se 29-3s-11e, Gray tnp, 1 mi south of Grayville, moving in materials.

Williamson County—Shipman et al's Chamness 1, nw sw sw 21-9s-2e, rig.

COMPLETIONS

Christian County—Oil Development Co. and Giffert Drilling Co.'s Post 1, se sw nw 1-14n-1w, Stonington tnp, abnd in Niagaran at 2260 ft.

Coles County—F. S. Ingram's Wilson 1, ne sw 4-13n-14w, East Oakland tnp., abnd 525 ft.

Jackson County—Ben Banner's Dean 1, ne ne se 33-7s-3w, Ora tnp, St. Genevieve top 1290 ft, abnd 1380 ft.

St. Clair County—Paul Moseback's J. C. Miller, se se nw 31-1s-7w, Freeburg tnp, top Devonian 1486 ft, top Trenton 1927 ft, abnd 1962 ft.

Washington County — J. L. Henderson's Kornegger 1, ne ne nw 8-3s-1w, Dubois tnp, top Fredonia 1628 ft, abnd 1713 ft. Jepp & Skidmore's Hoelscher 1, sw ne se 25-2s-5w, Johannisburg tnp, top Fredonia 1265 ft, abnd 1331 ft.

KANSAS

FIRST REPORTS

Barton County—York State Oil Co.'s Marchand 1, c el ne ne 24-20-12w, dr.

Cowley County—Lloyd et al's Jones 1, cel w½ e½ 2-31-2e, dr.

Jackson County—McKnab et al's Spurgeon 1, se sw se 28-10s-15e, rur.

Kiowa County — Sinclair-Prairie Oil Co.'s Price 1, nwc sw 22-28s-20w, lcn.

Phillips County—Blue Stern Oil Co.'s Donaldson 1, c el ne 25-5s-18w, rur.

Rice County—Gulf's Barngrover 1, c wl sw sw 30-19s-9w, lcn.

Russell County—Phil-Han Oil Co.'s Hill 1, se sw sw 16-14-14w, rig.

COMPLETIONS

Cowley County—Phillips' Esch 1, sec ne 19-33-6e, 2½ mi nw Esch gas pool, top Lansing 1830 ft, top Kansas City 2775 ft, top Mississippi 3073 ft, top Kinderhook 3414 ft, top Chat 3470 ft, top Arbuckle 3535 ft, show dead oil 3535-37 ft, sulphur odor, abnd 3452 ft.

Ellis County — Bridgeport Machine Co.'s Froelich 1, c wl sw 34-12-16w, 1½ mi ne Emmeran pool, top anhydrite 1154 ft, top Topeka 2985 ft, top Kansas City 3245 ft, top conglomerate 3500 ft, top Arbuckle 3517 ft, abnd 3540 ft.

Stafford County—Continental et al's Maggie Russell 1, swc ne 13-25-13w, 1 mi s Leesburgh pool, completed, top anhydrite 735 ft, top Topeka 3040 ft, top Lansing 3550 ft, top Viola 3900 ft, top Simpson 3970 ft, top Arbuckle 4024 ft, td 4075 ft, 2843 bbls, gr 38.

KENTUCKY

FIRST REPORTS

Hancock County—W. P. Hildebrande et al's Leoti 1, 3 mi south of Lewisport, dr, a McClosky test.

Union County—Albert Brauer and C. H. Daniels' W. H. Pollard 1, 3 mi west of Uniontown, a McClosky test, sp.

COMPLETIONS

McLean County—J. C. Ellis' Stevens Heirs 1, 1 mi southwest of Livermore, started at 200 barrels a day as county's first McClosky producer, 1640 ft.

SOUTH LOUISIANA

FIRST REPORTS

Cameron Parish—Union Sulphur Co.'s Sweet Lake Land & Oil Co. 1, six mi ne of Sweet Lake field, 330 ft s and 330 ft e nwc 9-12s-7w.

COMPLETIONS

Assumption Parish—Humble's Milliken & Farwell 1, Labedieville area, section 15-14s-14e, abnd 11,920 ft.

MICHIGAN

FIRST REPORTS

Allegan County—R. B. Tamblyn's McLaughlin Estate 1, ne ne ne 26-2n-12w, lcn.

Oceana County—White River Land Co.'s Land Co. 1, ne se nw 27-13n-16w, rig.

Roscommon County—R. B. Tamblyn's Gage 1, ne ne sw 28-22n-4w, rig.

Van Buren County — Temple & Lingers' Brink 1, ne ne se 20-3s-15w, lcn.

Midland County—Sun Oil Co.'s Adams 1, c w se nw 16-16n-1e, rig.

COMPLETIONS

Gladwin County—Sun Oil Co.'s Tuckerman 1, c e ne ne 2-17n-2w, Beaverton twp., Dundee 3870 ft, abnd 3990 ft.

Mecosta County—Gulf Refining Co.'s Klinfelter 1, se nw se 22-15n-9w, Colfax township, abnd in Marshall, 1445 ft.

Ottawa County—Gordon Oil Co.'s Berg 1, nw ne ne 13-7n-16w, abnd in Traverse, 1715 ft. Carscallen & Andersons' Longnecker 1, se se se 4-7n-13w, Tallmadge twp., Traverse 1980 ft, pay 1980, Dundee 2292, td 2374 ft, plug back to 1981 ft, acidized, estimated 45 barrels daily.

OKLAHOMA

FIRST REPORTS

Coal County—Sinclair-Prairie Oil Co.'s Clellan 1, ne sw se 26-1n-8e, pits.

Jackson County—English et al's Lee 1, nwc se 36-2n-19w, dr.

Kiowa County—Ray et al's Madison 1, nwc sw 11-2s-16w, lcn.

Logan County—Helmerich & Payne's Johnson 1, sec 2-15n-1e, lcn.

Tillman County—Helf et al's Brisley 1, nec 22-1s-19w, lcn.

COMPLETIONS

Cleveland County—Harper & Turner's Taylor 1, se ne nw 23-8n-2w, 2 mi ne Noble, top Layton 5182 ft, top Elk City 5170 ft, top Perry gas sd 5270 ft, top Checkerboard 5608 ft, top Oswego 6633 ft, top Woodford 7090 ft, top Hunton 7166 ft, top Sylvan 7498 ft, top Viola 7620 ft, top Dolomite 7750 ft, top Wilcox 7994 ft, abnd 8008 ft.

Cotton County—Groce et al's Collins 6, nw nw ne 18-4s-10w, 6 mi sw Temple, so 1240 ft, hfw 1240-46 ft, abnd 1288 ft.

OHIO

FIRST REPORTS

Brown County—J. P. Kappas et al's George Moore 1, Perry tnp., 1½ mi south of Fayettesville, dr 950 ft.

EAST TEXAS

FIRST REPORTS

Angelina County—K. L. McHenry et al's Mrs. J. S. Russell 1, 175 ft fr n and 450 ft fr w lines of 20-ac tr, A. Flores sur, 4 mi n Lufkin, cem surface pipe.

Falls County—M. A. Hayes et al's D. G. Wooten 1, 150 ft fr sw line of 100-ac tr, and 450 ft fr se line of tr and J. Powell sur, 8 mi se Lott, rig.

Red River County — Hampton-Osteen & Wooley's J. M. Roberts 1, 600 ft fr n and 791 ft fr e lines of 100-ac tr, J. Ware sur, 12 mi n Clarksville, lcn.

Upshur County—Gaskill Oil Corp.'s Earl E. Arnold 1, 181 ft fr n and s and 150 ft fr w lines of 6-acre tr, J. Scott sur, 2 mi se Jamestown, mim.

Harrison County—Jno. A. Hughes' T. J. Taylor 1, 330 ft from swc 20-ac tract in nwc 617-ac lease, H. McNutt survey (6 mi nw of Karnack), lcn.

COMPLETIONS

Houston County—Humble O&R Co.'s G. W. Mobley 1, 350 ft fr nw and 450 ft fr sw lines of 100-acre tr, J. L. Riviere sur, elev 254 ft, Pecan chalk 4280-4364 ft, Austin chalk 5305-5610 ft, top Woodbine 5878 ft, abnd in salt

water 5958 ft. Leggett & Gossett's B. F. Gardner 1, J. Thorn sur, elev 239 ft, top Crockett 660 ft, top Sparta 1140 ft, top Carrizo 2105 ft, abnd 2200 ft.

Trinity County—C. D. Davis et al's J. D. Gibson 1, 4 mi ne Trinity, abnd 2630 ft.

Upshur County—Brown-Gardner & Higginbotham's J. J. Crawford 1, 150 ft out of se corner of 200-ac tr, T. Jackson sur, elev 347 ft, Pecan chalk 2475-2987 ft, Austin chalk 3698-3775 ft, top Woodbine series 3958 ft, abnd 4173 ft.

SOUTH TEXAS

FIRST REPORTS

Bee County—Magnolia's McKinney 1, 2970 ft nw line, 2970 ft s line of 1195.4-ac tr, Randolph sur, 2 miles southeast Pettus, moving in.

Duval County—Gravis, Parr 1, 330 ft n line, 330 ft w line, block 2, Gravis sub, San Andres grant, 7000 ft se Longhorn field, moving in.

Hidalgo County—Rowan & Hope's A. Bazan 1, 330 ft n line, 330 ft e line of sub 6-A, share 9-A, San Ramon grant, northwestern part of county, rigging up for 7500-ft test.

Jim Wells County—Texas Gulf's Garcia 1, 676 ft n line, 274 ft e line, 200-acre lease, Barrera sur, 10 miles nw Alice, location for 7000-ft test.

Live Oak County—H. F. Baker's W. Rossi 1, 480 ft n line, 1254 ft e line 136-ac lease, Birdget Haughey survey, 2½ miles ne Three Rivers, lcn.

Starr County—Transwestern Oil Co. et al's W. I. Cameron 1, 600 ft s line, 990 ft w line, sec 228, 2 miles northeast Rincon field, moving in.

COMPLETIONS

Hidalgo County—Pan American's Vina 1, 3471 ft n line 918 ft w line, share C, Mestinas grant, drilled to 8123 ft, sidetracked, drilled to 6726 ft, abnd.

Jim Wells County—Magnolia's S. Maun 1, 660 ft n line and e line lot 25, La Gloria sub, discovery well of La Gloria field, drilled to 7545 ft, perforated 6560-70 ft with 18 shots flowed 69 barrels 60 gravity distillate, 2½ mcf gas per day 3/16 ch, 2600 lbs tubing, 2610 lbs casing pressures. Parr's Carter 1, 466 ft n line and w lines, block 4, Lancaster sub, 2½ miles w Alice field, abnd 5518 ft.

Live Oak County—Hotchkin's Wade 1, begin se cor Pearce sur, 1930 ft s thence 330 ft e at rt/a to lcn in Sommers sur, abnd 2438 ft in Yegua.

McMullen County—Holbrook & O'Farrel's Miles 1, 4450 ft s line, 500 ft w line Poitevent sur No. 143, 23 mi sw Tilden, abnd 1514 ft. Schimmel's Hagist 2, 330 ft w, 990 ft n from sw cor n½ e½ BS&F sur No. 123, abnd 2134 ft.

San Patricio County—Plymouth's Wilson 1, 467 ft n line and e line of lse, John Brown sur, 8100 ft nw of Turkey Creek, abnd 7038 ft.

Starr County—Banks Miller's Garcia 2, 2540 ft s line 4300 ft w line share 5-C, por. 71, abnd 665 ft.

Zapata County—Leake's Vela 1, 150 n line, 300 ft w line, blk 1, sec 5, 2 mi s Henne, Winch & Faris pool, abnd 2511 ft. H. F. Wilcox's Gilliam 1, 330 ft n line and e line 23¼ sec 11, blk 2, 6 mi ne Batesville, abnd 4014 ft, tested salt water in Edwards limestone.

NORTH TEXAS

FIRST REPORTS

Archer County—Bridwell Oil Co.'s Frank Schroeder 1, 600 ft fr e and 200 ft fr s lines lot 56, blk 4, Clark-Plumb sub-div, rur for 1900-ft test. Jack E. Kadane et al's J. Hammi 1, 466 ft out of nec lot 60, blk 3, Clark-Plumb sub-div, 2 mi s Scotland, mim for 5600-ft test. Shell Pet. Corp.'s J. J. Perkins 1, 220 ft fr nec blk 47, Bell C.S.L. sur A-12, core machine for 1500-ft test.

Baylor County—J. W. Baldwin et al's W. B. Mills 1, 300 ft fr s and 304 ft fr w lines of n¼ ne¼ sec 2413, TE&L Co. sur, 2 mi e and 5 mi s of Westover, lcn for 1500-ft test.

Wise County—Webb Gregg et al's D. Lutrell 1, 660 ft out of sec Jos. Mitchum sur, Pat. 3.3392, 2 mi nw Hatch Station, dr 285 ft.

COMPLETIONS

Archer County—Bridwell Oil Co.'s V. F. Veitenheimer 1, 200 ft out of sec sec 60, blk 4, Clark-Plumb sur, trace oil 813-16 ft, Gunsight lime 995-97 ft, abnd 1117 ft. L. T. Burns et al's Maude Thuman 1, 150 ft out of swc sec 1847, TE&L Co. sur, Gunsight 1002-16 ft, abnd in shale 1132 ft. Eph Griffin et al's Waggoner Est. 1, 456 ft fr s and 660 ft fr e lines H&TC sec 3, blk 4, A-201, top K-M-A lime 4090 ft, lower Strawn pay 4393-4408 ft, gauged 95 bbls 42.1° oil 3 hrs, ¾-inch tubing choke natural on proration gauge.

Clay County—L. T. Burns et al's Browning Bros. 1, 330 ft out of sec blk 94, J. H. Belcher sur, lower Strawn pay 4432-61 ft, flowed 450 bbls 44.2 gravity oil 12 hrs via tubing and varied chokes, flowed 119 bbls oil 2 hrs ¾-inch choke. Wood Pet. & Royalty Co.'s Kempner 1, 330 ft out of swc blk 44, Bosque C.S.L. sur, abnd 4268 ft.

WEST TEXAS

FIRST REPORTS

Jones County—A. B. Bissey et al's Mary Spurrier 1, 220 ft fr s and 285 ft fr e lines blk 1, W. C. Walker sur No. 6, A-517, 3 mi n Nugent, cem sur pipe. S. C. Herring et al's John Guitar Sr. 1, 300 ft out of ne cor of w½ of 200-ac tract, Fred Sieberman sur No. 12, mim.

Pecos County—Clayton W. Williams et al's T. P. Land Trust-Humble 1, 330 ft fr swc ne T&P sec 95, blk 3, dr 100 ft.

COMPLETIONS

Andrews County — Atlantic-Standard of Texas' University 1-B, c se nw T&P sec 1, blk 44, T-1-N, elev 3138 ft, top anhydrite 1600 ft, top Yates 2700 ft, top brown lime 3620 ft, pb fr sul w 4310 ft to 4180 ft, used 3000 gals acid and 140 qts nitro 4140-80 ft, tested 15 gals oil with water and abnd.

Jones County—Gregg Oil Co. et al's C. D. Appling 1, 906 ft fr n and 330 ft fr w lines sw sec 32, BBB&C sur, oil sand 2631-38 ft, flowed 206 bbls 32 gravity black oil natural 12 hrs for potential. S. B. Roberts Co. et al's L. A. Collier 1, 220 ft out of nec se¼ T&P sec 36, blk 15, trace oil 1803-08 ft, show gas 1852-55 ft, abnd in shale 2280 ft.

Pecos County—Geo. T. Abell et al's O. W. Williams 1, 2310 ft fr ne and 330 ft fr se lines H&TC sec 11, blk 3, elev 2390 ft, top anhydrite 305 ft, salt series 595-1075 ft, top Yates 1235 ft, top brown lime 1165 ft, abnd in sul w 2460-64½ ft.

Taylor County—Tal-Vez Oil Co.'s D. T. Hooper 1, 300 ft fr n and 750 ft fr e lines lot 21, Guadalupe County School Surveys Nos. 120 and 121, gas pay 2244-92 ft, shale 2292-97 ft, used 2000 gals acid, initial 3,250,000 ft gas, 850 lbs rock pressure.

TEXAS GULF COAST

FIRST REPORTS

Jefferson County—Smith & Hebert's S. Turner 1, China area, 466 ft out of the nec of the n 20 acres of 100-acre tract in J. Gerish, Jr., sur, lcn.

COMPLETIONS

Austin County—L. Hranicky et al's Fee 1, nw of Wallis, 5350 ft fr nw line and 700 ft fr ne line of J. Stevens sur, abnd 1320 ft.

Texarkana, Ark.—Basin Exploration Company of Texarkana has leased approximately 10,000 acres of land in Butler County, southern Missouri, and geophysical exploration will start thereon soon under direction of Thad A. Bryant who will open an office in Poplar Bluff.

SALE OF OIL AND GAS LEASES—Department of the Interior, General Land Office, Washington, D. C. Notice is given that the following described lands and deposits of oil and gas therein contained are offered to the qualified bidder of the highest bonus per acre for leasing, pursuant to section 17 of the leasing act of February 25, 1920 (41 Stat. 437), as amended by the act of August 21, 1935 (49 Stat. 674), at the royalty rate scale in the lease form shown in Circular 1386: Unit No. 1, the principal island, East Timbalier Island, known locally as Bird Island, located in fractional Secs. 34, 35 and 36, T. 23 S., R. 21 E., Secs 2 and 3, T. 24 S., R. 21 E., and Sec. 31, T. 23 S., R. 22 E., Louisiana Meridian, situated on the Gulf Coast of La Fourche Parish, State of Louisiana, lying above the elevation of mean high tide, containing 295.77 acres, more or less. Unit No. 2, two islands, adjoining Unit No. 1 in a northeasterly direction between said principal island and Raccoon Pass, Island No. 1 located in fractional Sec. 31, and Island No. 2 located in fractional Sec. 32, both in T. 23 S., R. 22 E., Louisiana Meridian, situated on the Gulf Coast of La Fourche Parish, State of Louisiana, lying above the elevation of mean high tide, containing 11.69 and 69.29 acres, respectively, more or less. Sealed bids will be received in the office of the Secretary of the Interior up to 12:00 o'clock (noon) April 3, 1939. Bids must be submitted on each unit separately but both units, if awarded to the same bidder, may be included in a single lease. Each bidder must submit a certified or cashier's check or draft for 1/5 of the amount bid, payable to the order of the Secretary of the Interior, and furnish a showing of qualifications as required by section 7 of Circular 1386. The remaining 4/5, together with the annual rental at the rate of $1 per acre, must be paid by the successful bidder prior to the issuance of lease, and the deposits of other bidders will be returned. The envelopes should be marked plainly "Bid for Unit No.————(1 or 2), East Timbalier Area. Not to be opened before noon, April 3, 1939." The bidders are warned against violations of the provisions of Sec. 59 of the United States Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. Protests by the State of Louisiana and others claiming under the State against the granting of Government leases for the group of islands on the ground that they are the property of the State were overruled by the Secretary of the Interior in a decision rendered July 29, 1938 (A.21589), after an oral hearing at which the protestants were represented. The Secretary held that the United States had asserted ownership of and jurisdiction over East Timbalier Island for more than 100 years and that the group of islands are public lands of the United States. In the interest of securing full and unrestrained bidding, assurance is given to all bidders that the United States will defend its title to the Islands on its own behalf in any litigation instituted in which, in its judgment, any issue of title to the Islands is properly and appropriately raised. In the event litigation is instituted in which title to the Islands is involved and the claim of title of any adverse party is ultimately sustained, the full amount of bonus paid by the successful bidder will be returned to him. Commissioner, General Land Office.

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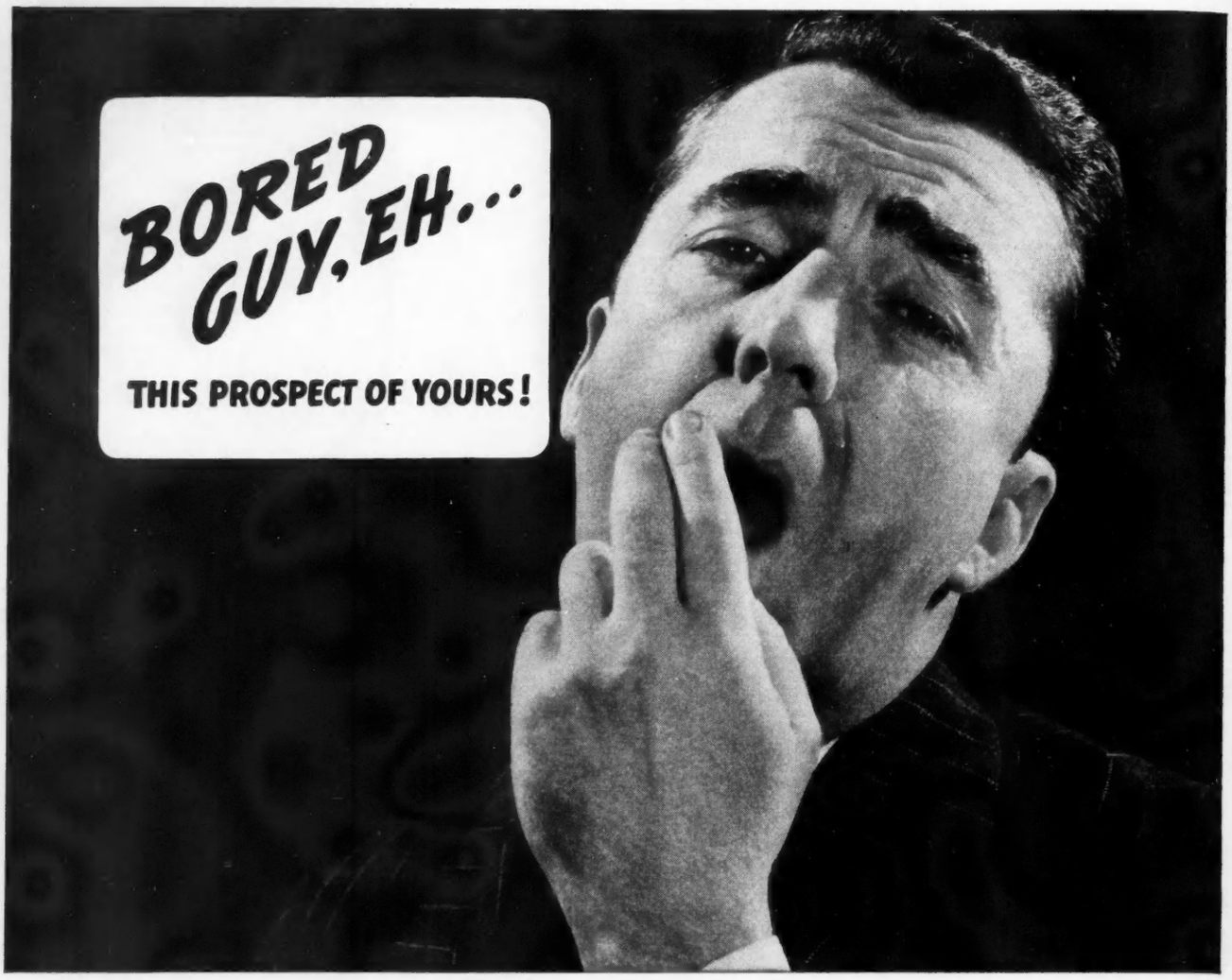

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NOTES FOR THE Equipment Buyer and User

Spinning Line Swivel

L-K PUMP VALVE COMPANY

The L-K Pump Valve Company, Houston, Texas, manufactures several types of Spinning Line Swivels, the use of which has proved to be a safe fast way for making up drill pipe or casing without danger of the spinning line becoming kinked.

Every swivel is tested to a pressure higher than it usually works under, although not high enough to put undue

L-K Spinning Line Swivel.

strain on any part. These swivels are made of high quality alloy steel and are accurately machined. Each one is packed with grease when assembled. A high quality ball bearing is used in the single swivel, while two are used in the double type.

Aside from the increased speed and safety in spinning up drill pipe and casing, this swivel will pay for itself in a short time by reducing the wear on the spinning line, the manufacturers claim.

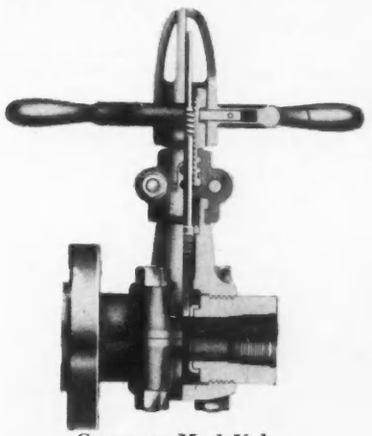
Mud Valve

CAMERON IRON WORKS, INC.

Cameron Iron Works, Inc., Houston, Texas, present a unique design in their new Flex Seal Mud Valve, which is equipped with a renewable resilient flow-way insert to minimize cutting and erosion, as well as to insure leak-proof closure under pressure. According to the manufacturers, this valve has a remarkable capacity to withstand the destructive action of abrasive-laden fluid moving at high pressure and velocity, and to seal positively, even after a long period of service.

The resilent insert absorbs the cutting action of abrasive-laden fluid, with a very slow rate of wear, and when worn out, it may be replaced in a few minutes at low cost, without removing the valve from the manifold or pipe connections by simply releasing the four body bolts and dropping the lower half of the body.

Hubs of the valve are connected to the body by a series of parallel shoulders and grooves which interlock with



Cameron Mud Valve.

corresponding shoulders and grooves in the assembly valve body. The hubs swivel freely when making connections, permitting the valve to be used as a union in breaking down a manifold. Hubs may be fitted with threaded, flanged, welded-on, or any special connection on the outer end.

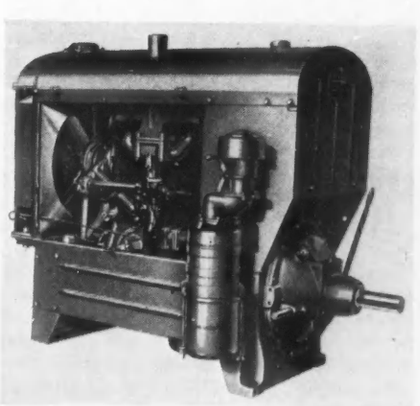
In the full-open position, the heat-treated steel gate is retracted out of the flow-way. Even though the gate may be sand-cut or damaged, after long service, a positive shut-off is effected when it is imbedded in the insert. The valve opens and closes with remarkable ease under full rated test pressure of 6000 pounds. No leverage other than that provided by the hand wheel is required to operate it under the highest working pressures, it is claimed. The valve is of the indicating stem type, clearly showing the position of the gate at all times.

An illustrated descriptive folder will be sent by the manufacturer on request.

Power Unit

INTERNATIONAL HARVESTER COMPANY

The new Model U-10 power unit, of heavy-duty, four-cylinder, valve-in-head construction, has been announced by



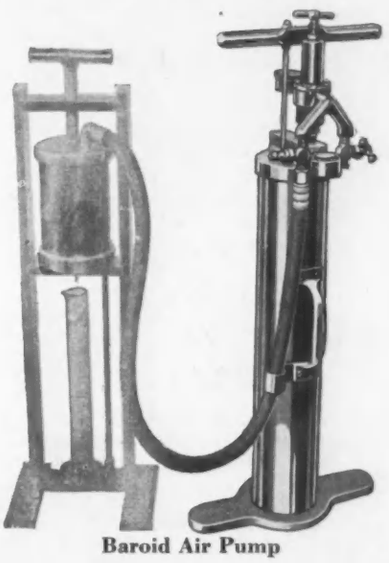
International Model U-10

International Harvester Company, Chicago. The new model unit has the same type of ball bearing crankshaft engine that has stood the test of hard service in various fields. The ball bearings at each end of the crankshaft are of large size, retain correct alignment, and never require adjustment, according to the manufacturer. The engine has a 4½-inch bore, 5-inch stroke, and piston displacement of 283.7 cubic inches. It develops a maximum of 45 horsepower at 1200 r.p.m. when operating on gasoline, and 41½ maximum horsepower when equipped with straight gas attachment and operating on 800 Btu. gas. Combination gas-gasoline equipment is also available, as well as equipment for operation on distillate. The manufacturer stresses the dependable lubrication system, long life, economical maintenance, rigid foundation, and special equipment available for various jobs.

Air Pressure Pump

BAROID SALES DEPARTMENT

With the introduction of the new Baroid Air Pressure Pump, Baroid Sales Department, 837 Jackson Street, Los Angeles, affords the operators who



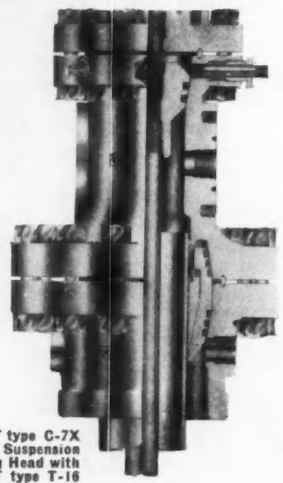
Baroid Air Pump

are drilling in remote districts the opportunity to make use of the Baroid Wall-Building Tester.

This Wall-Building Tester involves the compressing of the drilling mud at 100 pounds pressure per square inch against a filtering medium and thereby obtaining a comparative determination of the thickness of cake formed on the walls of the hole and the amount of water lost to the formation. Cake thickness and water loss are influenced by the percentage and physical state of

O-C-T SLIP SUSPENSION CASING HEAD permits drilling, running and cementing casing and hanging casing at any desired point through oversize flanged blowout preventer equipment. Last joint of casing is cut off above hanger and welded thereto as shown below . . . no special length joint of casing is required. T-16 Tubing Head flanged above Casing Head, as shown below, permits drilling in and running and landing tubing through blowout preventer equipment. Lock down screws force hanger into sealing position before removal of preventers.

Full particulars gladly sent on request.



O-C-T type C-7X Slip Suspension Casing Head with O-C-T type T-16 Tubing Head flanged above.

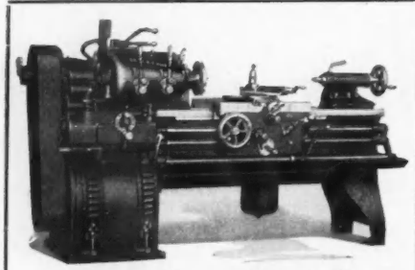
OIL CENTER TOOL CO.

O-C-T

HOUSTON, TEXAS, U.S.A.

CABLE ADDRESS "OCENTOL"

Sold Through Supply Stores



The Boye & Emmes Timken Bearing Engine Lathe

COMPLETE LINES

Machine Tools—Metal Working Machinery—Bolt and Pipe Threading Machines—Electric Arc Spot and Butt Welders—Hand Power and Electric Traveling Cranes—Foundry and Forge Shop Equipment

D. S. MAIR
MACHINERY CORPORATION

HOUSTON	DALLAS
4000 Clay	322 Allen Bldg.
Stanley Mair	Chas. Harter
Fx. 1466	7-2874

Standco
NO-SMOKE

STANDCO BRAKE LINING

Nothing novel—no bunk—but it gets the job done without scoring brake rims. See page 2100, Composite Catalog.

Standard Brake Lining Co.

NOTES FOR THE Equipment Buyer and User

colloidal material and amount of inert solids. Heretofore whether or not a mud would form a thin and impervious cake had to be determined by individual tests for the viscosity, gel-strength, sand and salt content, and percentage of solids. However, the Baroid Wall-Building Tester simplifies all this by providing a direct determination of the wall-building characteristics of a mud and consequent over-all evaluation of drilling mud.

The Baroid Air Pressure Pump has been designed especially for supplying the air pressure for the Wall-Building Tester in remote regions or other cases where it is inconvenient or undesirable to use the standard cylinder containing 1800 pounds of compressed air because facilities for refilling the cylinder are not readily available. With the Baroid pump it is merely necessary to work the pump for a minute or two and sufficient pressure will be built up.

It is constructed of light-weight but extremely tough molychrome steel and duralumin and has an attractive polished finish, which is non-tarnishable and rust-proof.

The pump is of the two-cylinder type and consequently requires only about two minutes of easy pumping to raise the pressure to 150 pounds which is the maximum capacity. It will hold pressure sufficient to run the Baroid Wall-Building Tester for about one hour at 100 pounds per square inch pressure without additional pumping.

The unit is equipped with a reservoir pressure gauge, a regulator to provide uniform working pressure, a working pressure gauge, and a bleeder valve.

A durable hose is provided for ready connection to the tester. All parts are readily replaceable at the Baroid Sales Department at 837 Jackson Street, Los Angeles, California.

For greater portability in taking the Baroid Wall-Building Tester and Air Pressure Pump from well to well, a fitted kit is available containing all necessary accessories.

Pump

NATIONAL STEEL PUMP COMPANY

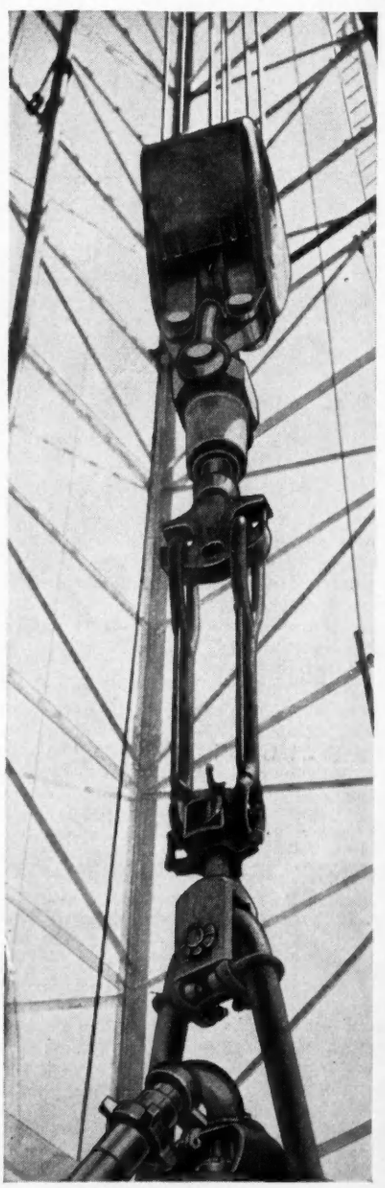
A new pump of welded steel construction and designed for truck mounting has been announced by National Steel Pump Company, Tulsa, Oklahoma. They are especially suitable for acidizing oil wells and for mounting with portable core drilling outfits.

The pump was designed for 3000-pound working pressures; has a chain drive with sprockets and chains matched for heavy overloads; incorporates an eccentric construction that permits the use of a straight steel main shaft of hot rolled nickel-chromium, without cranks; has a capacity of 125 g.p.m.; is totally enclosed; comes with offset centers; and has positive lubrication.

Connector

THE NATIONAL SUPPLY COMPANY

Offered for greater operating convenience and flexibility in deep drilling, the DA-30 Rotary Connector (Patented), manufactured by The National Supply Company, replaces the conventional rotary hook. The distinctive design eliminates the usual hook member and in its place provides a yoke from which elevator links can be independently suspended. Drill pipe is handled



National DA-30 Connector

in the usual manner, and a special shank—easily attached to the swivel bail—provides a means of carrying the swivel with the regular drill pipe elevator when drilling.

The arrangement of carrying the elevator links independently of each other makes for increased flexibility in handling the elevator when running drill

NOTES FOR THE Equipment Buyer and User

pipe. Vertical suspension of each link also provides a better balance of the loads on the elevator. There is no possibility of the links jumping out of the yoke.

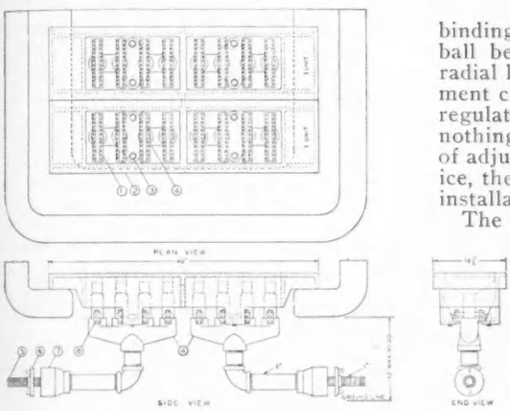
Carrying the swivel below the elevator links eliminates the chance of the links bumping against the swivel bail or interfering with the rotary hose.

Forged steel for all the load carrying parts, 300-ton capacity, two ball bearings for ease of rotation, fully-enclosed spring and locking mechanism are some of the more important construction features of this DA-30 Connector.

Pre-Mixing Type Burners

THE WEBSTER ENGINEERING COMPANY

The Webster Engineering Company, Tulsa, has added to its line of burners a pre-mixing type gas burner for oil country type fire box boilers. The new burner is known as the Webster Series 900 (vertical).



Series 900 Pre-Mix Type Burner for Drilling Boilers

Each burner unit consists of a metal box in which is installed two burner assemblies, each consisting of four parallel bars, in which the burning ports are drilled. The units are rated at 50 to 80 boiler horsepower, depending on the draft and gas pressure available. A mixture of gas and air is supplied to the bars by means of atmospheric mixers which may be installed in any convenient location. The burner box may rest directly on the mud ring, in the case of wet bottom boilers, or may be supported as desired, in the case of open bottom boilers.

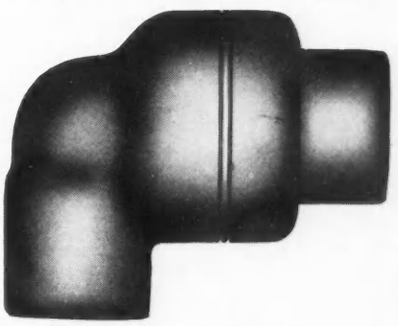
It is claimed that by use of the parallel bars the flow of secondary air, between the bars, is uniform over the entire area of the burner. This eliminates "high center" fire and keeps the flame off the crown sheet. Uniform temperature along the length of the bars, together with the absence of "dead spots" or hubs, tends toward longer life of the burning bars.

The Series 900 vertical burner is also made with individual metal box for each assembly of four bars. This decreases the weight and adds the feature of easy and quick moving.

Ball-Bearing Swing Joints

CHIKSAN OIL TOOL COMPANY

Chiksan Oil Tool Company, Fullerton, California, announces the new ball bearing swing joints in ⅜- and ½-inch sizes, designed specifically for operations that require small leak-proof and pressure-tight swing joints. Each swing joint gives full 360° rotation without



Chiksan Swing Joint

binding. Double rows of hardened steel ball bearings serve both to carry the radial load and to keep the packing element compressed by maintaining a pre-regulated thrust load upon it. There is nothing to tighten, nothing to get out of adjustment and, under ordinary service, the joints require no greasing after installation, it is stated.

The new swing joints are compact in design and work freely at their rated test pressure. High-pressure joints are of steel construction, tested to 4000 pounds; low-pressure joints are made of brass or malleable iron, tested to 300 pounds. These joints can be used efficiently for fluids, gases or steam. Five styles are available for various rotating motions and each is furnished with standard thread-pipe connections. Full inside pipe diameter is maintained throughout each swing joint, providing full, unobstructed flow of liquids, gases or steam. By applying the proper styles, the required degree of flexibility is easily secured for each particular operation. A bulletin describing these new swing joints in detail is now available on request.

Direct-Current Welder

WILSON WELDER AND METALS COMPANY

A new direct-current arc welding motor generator set, with a rating of 150 amperes at 25 volts, and having a range of adjustments from 20 to 200 amperes at 25 volts, has been announced by Wilson Welder and Metals Company, Inc., New York.

Current control on this new welder consists of a three-point current switch and a dial-rheostat control for fine adjustment. It is stated that the smoothness and precision of this adjustment makes it possible always to get the right current, and greatly enhances the

REED'S 'B-R' DRILLING BIT WITH WIRE LINE RETRACTABLE CORE BARREL

HARD FORMATION HEAD (Interchangeable with Soft Formation Head)

REED 'B-R' Drill Collar and 3-Blade Drilling Bit with Core Barrel in position

REED ROLLER BIT CO.

For Deep Wells

"They Can Take It" . .

Toughest materials, especially processed to meet rigid tests and backed by 27 years of valve and pump cup specializing — Dragon Cups (*Composition*, *Nobs* and *Leather*) are built to "take plenty of punishment," *saving your profits, time* and *nerves.*

For Shallow Wells

"On Duty or in Competition — Fearless As the Dragon"

The Dragon Mfg. Co.
Marietta, Ohio

NOTES FOR THE Equipment Buyer and User

Wilson 150-Ampere Direct-Current Welder

adaptability of the machine to all types of electrodes, from bare to heavily coated. Open circuit voltage is from 40 to 75 volts. The set will use electrodes up to 3/16-inch diameter. Standard wiring is for 3-phase, 220- or 440-volt, 60-cycle power supply.

Welding qualities claimed for this welder are a steady arc and quick voltage recovery, that it welds without current surges and without losing the arc when welding on thin sections. It is expected that these features will greatly reduce losses due to burning through, and also those due to the necessity for rewelding defects caused by arc interruptions.

The portable model, equipped with strong rubber tired casters, is 12 by 26¾ inches, stands 23⅝ inches high, weighs 338 pounds. The stationary model, without casters, weighs 8 pounds less. The new welders are sturdily built for continuous production service, and attractively finished in yellow.

Liquid Level Controllers

Natural Gas Equipment, Petroleum Securities Building, Los Angeles, has released an illustrated pamphlet describing the function, construction, and operation of liquid level controllers.

Geared Pipe Pushing and Pulling Jack

DUFF-NORTON MANUFACTURING COMPANY

For laying pipe under culverts, roads, rights-of-way without tunneling or interruption to traffic, a new and improved type of pipe pulling and pushing jack has been developed which has found wide application and use in railroad construction, according to the manufacturers, Duff-Norton Manufacturing Company of Pittsburgh.

This jack differs from other jacks for this work in that the pipe can be both pushed and pulled without changing the position of the jack.

A small trench is dug at the point of entry and exit and the jack placed therein and blocked with heavy timbers. A 3-foot section of pipe is screwed to the jack pilot and the piercing operation is ready to begin.

By working the jack handle back and forth, a tremendous pressure is applied forcing the pipe steadily through the ground formation. After each section has been pushed its length, a new section is added until the pipe emerges into the receiving end.

Larger pipe can be laid by simply connecting it to the smaller pipe and pulling back through to the original entry. The original setting of the jack is not changed during the operation. Descriptive literature is available from the manufacturer.

Adjustable Bolt Die Stock

THE TOLEDO PIPE THREADING MACHINE COMPANY

The Toledo Pipe Threading Machine Company, Toledo, Ohio, announce a new small, compact bolt threader for ¼- to ⅝-inch rods either U.S.S. or S.A.E. and ⅜-, 7/16- and ½-inch pump rod.

The unique feature claimed for this tool is the positive die adjustment for over, under, and standard threads. Segmental dies that are easily reground are used, and are adjusted by turning the knurled cam ring. Each die segment, even when standard setting is changed, takes a proportional share of the work, which makes easier cutting, smoother threads and longer die life.

Dies and guides are changed quickly. Die stock measures 17-inch over-all and weighs but 2¾ pounds. A small partitioned red enameled box can be furnished measuring 7¼ x 4¾ x 1¾ inches and holds a die stock with six sets of dies and guides. All

Toledo No. 101 Adjustable Bolt Die Stock

bright parts are highly polished and the die stock is enameled black.

Any combination of dies within the capacity of this "Toledo" Adjustable Bolt Die Stock can be furnished. Literature and prices will be furnished on request.

Explosive

E. I. DU PONT DE NEMOURS & COMPANY

A new blasting agent, "Nitramon S," for seismic prospecting by the reflection method has just been announced by E. I. du Pont de Nemours & Company, Wilmington, Delaware. It is packed in metal cans with ends which permit joining of a number of separate units before loading in the blast or shot holes.

"The blasting agent is much safer to handle and use than gelatin dynamites normally used for reflection shooting," the company's announcement says. "It is not an explosive in the accepted sense since it cannot be detonated by the strongest commercial detonators, by Cordeau or Primacord detonating fuse, by flame, or by heavy weights which is particularly important for the safety of field crews. Even the impact of a rifle bullet will not detonate the charge.

"As the separate cans may be joined together to form a single unit column of any desired weight, 'Nitramon S' is easier to handle than ordinary gelatin. As long as the sealed cans remain intact, the blasting agent retains its maximum blasting efficiency under water.

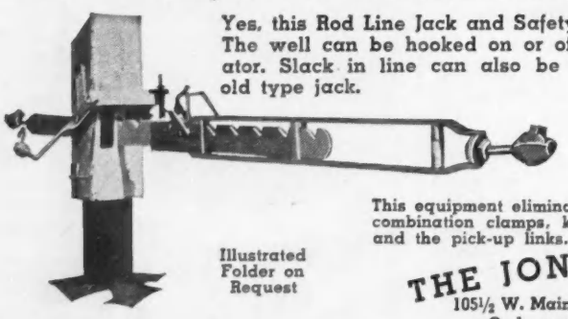
Spike Puller

WARREN TOOL CORPORATION

A patented claw bar with mechanical jaws that operate automatically has been announced by Warren Tool Corporation, Warren, Ohio. Operation of the mechanical jaws is controlled by the movement of the bar handle and the new tool eliminates the need of driving the claw under the spike head. The jaws are so made that they bite tightly into a slight amount of metal and hold firmly when strong leverage is used.

It is claimed that, in comparison with present methods, one man can now do

"Makes Pumper's Job as Safe as a School Teacher's"



Yes, this Rod Line Jack and Safety Hook Off is really SAFE! The well can be hooked on or off without danger to operator. Slack in line can also be taken up without use of old type jack.

This equipment eliminates turn buckles, C-links, four combination clamps, knock-off block, rod line jack, and the pick-up links.

Illustrated Folder on Request

THE JONES OIL CO.
105½ W. Main Phone 520
Ardmore, Oklahoma

the work of two and that headless spikes and drift bolts are readily removed. By a ratcheting action, the operator can take a series of bites into the spike or bolt and pull it out straight.

The gripper jaws or "toes," made of high strength forged and heat treated alloy steel, are quickly replaced right in the field. Operations are not delayed waiting on shop redressing.

The new bar eliminates hazards of spike pulling operations where flying pieces of metal result from sledge driving, or from forcible placing of the bar under a spike head. The new tool is named "Flex-Toe" and is backed by claims of long life and highly efficient, time-saving work.

Hanlon-Waters

Hanlon-Waters, Inc., Box 1559, Tulsa, Oklahoma, announces the publication of a new pictorial booklet replete with photographs of installations of oil and gas separators, gas scrubbers, A.P.I. bolted tanks, regulators and automatic controls for oil production, pipe lines gasoline plants, refineries, power and industrial plants. Copies can be secured by writing to the manufacturer.

Utility Pumps

Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, has issued a new four page leaflet 2199-C covering single suction, single stage close coupled utility pumps for every industry, handling from 10 to 1600 gpm and using motors up to 75 horsepower. It includes a cross-section of a typical unit with detail description of each part. Numerous pictures show views and arrangements involving a variety of horizontal and vertical applications.

Tank Gauge Hatches

Enardo Foundry and Manufacturing Company, Tulsa, Oklahoma, has released descriptive literature on oil storage tank thief and vacuum pressure hatches. The line, which is illustrated and analyzed as to construction, operation, and application, includes deadweight pressure and vacuum relief thief hatches, and lever-type stack valves.

Pumping Units

Oil Well Supply Company, Dallas, Texas, has published Bulletin No. 180 on the TC-5 model twin-crank pumping unit. Diagrams and specifications are included with explanatory material on design and application. Flexibility of utility is brought out in adjustments of stroke length, portability, and advanced engineering features.

Rotary Tables

Oil Well Supply Company, Dallas, Texas, is distributing Bulletin 158-A on the Model 17 Oilbath Rotary Table, explaining in detail the construction of a machine for shallow and medium depth drilling. A schematic diagram, completely dimensioned, a list of the parts, and a discussion of the compact construction and the oilbath system of lubrication, are included in the bulletin.

Engines

National Supply Company, Pittsburgh, Pennsylvania, has released Bulletin No. 226 on horizontal two-cycle twin-cylinder gas engines of types CTE and BTE for oil field central station generator service; No. 219 on horizontal two-cycle convertible gas engines of types CS and CM for pumping service.

NOTES FOR THE Equipment Buyer and User

Dowell Incorporated Opens District Office at Houston

Dowell Incorporated has opened a district office at 1209 Shell Building, Houston, with C. T. Young, district manager, in charge. S. C. Morian is district engineer attached to the office.

Iverson Tool Company Appoints District Manager in Illinois

Iverson Tool Company, Tulsa, announces that J. C. Harris has been appointed district manager for Illinois, and will make his headquarters at the company's store at Salem, Illinois, where a complete line of oil well supplies is stocked.

Petroleum Rectifying Company Representative to South America

R. L. "Bob" Easley of the Houston, Texas, branch of Petroleum Rectifying Company of California, left recently via plane for Venezuela on the first leg of a tour of inspection of Petreco Electromatic Dehydration Plants in the various oil producing countries of South America, which will extend over a period of several months. While there he also will supervise the installation of a number of new plants that have been shipped from Los Angeles during the past few months, and will contact certain operators throughout other oil producing districts who have shown interest in both the Petreco Electromatic Dehydrating and Desalting Processes.

Easley has a wide acquaintance among oil men throughout South America, having made several trips there for similar purposes during recent years.

Lord Manager of California Sales for Oil Well Supply Company

Clifford W. Lord, formerly president of Bolsa Chica Oil Company, has joined Oil Well Supply Company as manager of sales in California, according to Lester H. Keim, vice president. Lord's early work in the California oil business with the old Associated Oil Company and later with Captain John F. Lucey in the Mid-Continent, dates back to 1912. As general manager of the Lucey Manufacturing Corporation, Lord spent six years in the Mid-Continent and

CLIFFORD W. LORD

Eastern fields, returning to California in 1922 to join Buck & Stoddard, Inc., as vice president and general manager, which position he held until February, 1932. He then became vice president, and later president and general man-

BARGAINS

in first class used Oil Field Machinery of all kinds.

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Highest prices paid for

PIPE PROTECTORS

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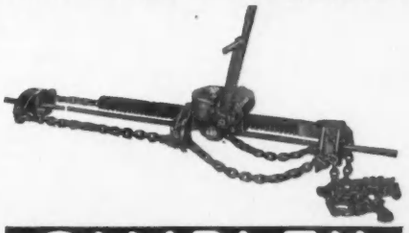
RELIABLE SUPPLY CO., Inc.

3645 Jensen Drive, Houston, Texas

Box 2715 **Phone C-9448**

N. Perel, Manager

It's Easy to Repair Pull Rod Breaks with the *New* Simplex 440 Pull Rod Jack!



SIMPLEX

GOLD MEDAL AWARD SAFETY JACKS

With the New No. 440 Simplex Worm Gear Pull Rod Jack one man can repair a pull rod break in a few minutes. The No. 440 quickly returns its cost. The speed crank quickly takes up rod line slack. Enclosed dust-proof gear mechanism. Improved one-piece slips. Straight line take-up; no kinking; no kick-backs; "turtle-back" easily installed; ample space for heading up. Easily pulls deepest central power wells (capacity 7 tons). New bulletin explains use; shows how they cut maintenance costs — write for Form Oil-39.

Stocked by your field store.

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Consulting Geophysicists
Specializing in Magnetic Surveys
Contracts accepted for domestic and foreign projects, using the most improved instrumental and interpretative technique.
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BOTTOM HOLE PRESSURE SATURATION
GAS OIL RATIOS RECOVERABLE OIL
CONTROL OF FLOW THRU FORMATION
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- Central Location
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J. S. MICKELSON, Manager
The SAM HOUSTON
HOUSTON, TEXAS

NOTES FOR THE Equipment Buyer and User

ager, of Bolsa Chica Oil Company. He assumed his new position with Oil Well Supply Company March 16, 1939. Lord was born in Grass Valley, California, and was graduated from the Mining Engineering College of the University of California in 1911. He is a member of the California Club, and the Bohemian Club in San Francisco, and is well known as a sportsman.

Kreer Appointed Sales Engineer of Templeton, Kenly & Company

Templeton, Kenly & Company has appointed W. H. Kreer, sales engineer. He formerly served the company as representative for the Middle-West for many years, and has a wide acquaintance among mill supply men.

Gomez Pinzon Opens Offices in Bogota

Jose Gomez Pinzon, chief of the school of engineering of the University of Bogota who is also a representative of manufacturers of oil field supplies, has opened offices at Carrera 9a, No. 13-71.

Illustrated Brochure

Independent Exploration Company, Houston, Texas, recently issued an attractive illustrated brochure that describes the organization's background, personnel, service and equipment. The brochure, now ready for general distribution, features short outlines on organization, record of achievement, clientele, instruments, research, principles, field work, and types of service offered.

Blow-Off Valves

Yarnall-Waring Company, Philadelphia, has published a circular on direct-acting and gear operated blow-off valves for oil field boilers.

Parkersburg Rig & Reel Company Opens District Office in Illinois

E. L. Byer, manager of the Dallas district sales office of The Parkersburg Rig & Reel Company, has been transferred to Clay City, Illinois, where the company is establishing a new district office to serve fields in Illinois, Michigan and Indiana. Sam P. Wallace, who has been stationed at Parkersburg, West Virginia, headquarters, has assumed charge of the Dallas office.

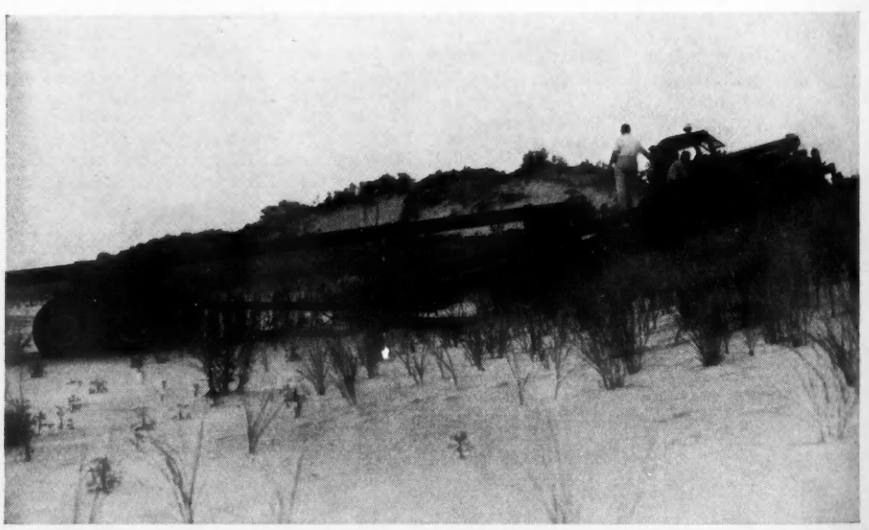
Walter O'Bannon Company Makes Changes in Sales Representatives

E. B. Beard, Walter O'Bannon Company representative at El Dorado, Arkansas, has taken an extended leave of absence because of his health, and has been relieved by W. J. Hennigan, transferred from the Kansas territory. The company has opened a new office at Midland, Texas, in charge of H. H. Richards, who is covering West Texas and New Mexico. R. L. Hodshire has been transferred from Kilgore, Texas, to Stillwater, Oklahoma.

Tank Hazard to Be Demonstrated At Houston Oil Show

During the meetings sponsored by the General Safety Committee at the Oil-World Exposition to be held in Houston, April 24 to 29, a demonstration entitled "Men Who Go Down to Their Death in Tanks" will be a feature attraction. This demonstration will be presented on April 28 and will be given by S. E. Whiting, vice president and chief engineer of Liberty Mutual Insurance Company of Boston, Massachusetts, who will be assisted by volunteer victims with emergency equipment loaned by the manufacturers. Whiting will come to Houston for the express purpose of putting on the demonstration.

This will be a living demonstration



Large Marmon-Herrington All-Wheel-Drive Truck and pole trailer with load of 30,000 pounds of railroad rails being tested out on the Sand Dunes of Northern Indiana before being shipped to Arabia. This is just one unit in a large fleet of vehicles built for service in the oil fields in the Arabian Desert.

DISTINCTIVE

Discriminating travelers enjoy the perfect service, beautiful appointments, refined atmosphere and convenient location of this internationally famous hotel.

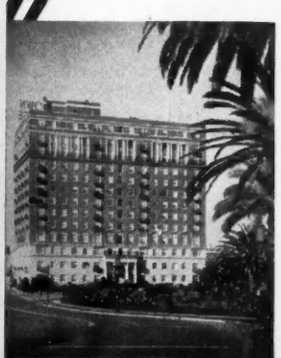
A. S. Kirkeby, Managing Director

The Blackstone

MICHIGAN AVENUE · CHICAGO

SUPERB Living

One of the world's finest hotels. Overlooking its own broad gardens, tennis and badminton courts. Home of the famous Zebra Room where the stars of Hollywood relax and enjoy themselves.



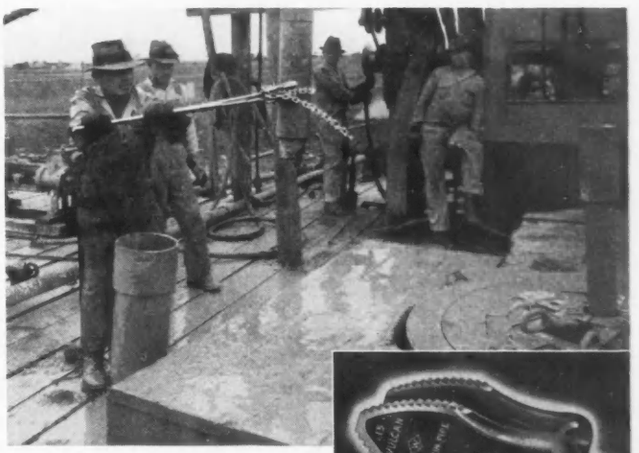
★

Under the same management as the Drake and Blackstone. Chicago. A. S. Kirkeby, Managing Director.

The Town House

WILSHIRE BOULEVARD

LOS ANGELES



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THAN ALL OTHER MAKES

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All over the oil fields you will find "Vulcan" Tongs the outstanding favorite everywhere. There are more Vulcans in use than all other makes combined. And the reason is that for more than forty years, Williams "Vulcan" Tongs have been demonstrating their ability to do the job well and take more than their share of punishment.

"Vulcan" Chains are proof-tested and certified. Jaws and Handle are tough drop-forgings. Through-Bolt is extra strong, and its U. S. Standard nut simplifies replacement. 9 sizes, with either Flat Link or Cable Chain, for 1/8" to 18" pipe.

and "Vulcan Supertongs"

The maximum in chain tong strength. Same design, but drop-forged from alloy and high tensile steel, heat-treated and equipped with Alloy "Superchain." 50% greater strength than regular "Vulcan" Tongs of corresponding size and weight. 8 sizes, for 1/8 to 18" pipe. Buy from your distributor.

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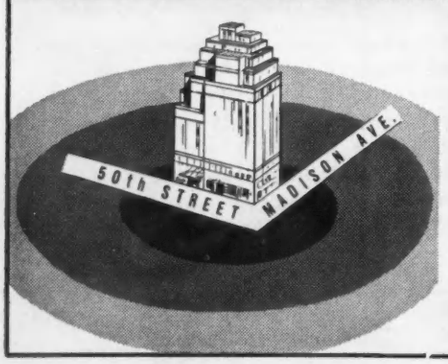
Because over 400 leading manufacturers have filed their complete or condensed catalogs in The Composite Catalog you will usually be able to find—immediately—what you need, but for those cases where you fail to find all the information you need on a piece of equipment, these self-addressed, postage prepaid blue cards are provided. Fill out a card, drop it in the mail, and the information requested will be sent promptly.

THE COMPOSITE CATALOG

POPULAR AMONG OIL MEN and THE BEST LOCATION IN NEW YORK



Many executives in the Oil industry stop here whenever business or pleasure brings them to New York. Quiet—away from the hub-bub, yet convenient to wherever you wish to go. Only one block from Rockefeller Center and a short walk to Grand Central Terminal. Also close to shopping and theatrical districts.

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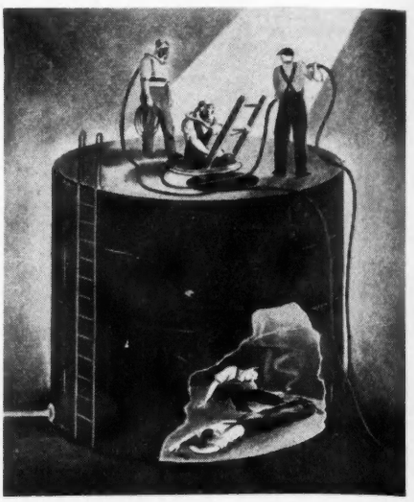

Tank used in Safety Demonstration

of typical instances of the catastrophic hazards present at times in enclosed spaces. It will be presented in three scenes and one interlude. Illustrations will be given of both the technical and human factors that are involved and how to guard against them.

A minimum height of 15 feet will be provided for the demonstration since an artificial simulation of a tank 8 feet high is used and part of the action takes place on top of the tank as well as inside of it. The audience will see what goes on within the tank as well as on the outside and above and will thus get the whole story of tank asphyxiation and explosion hazards. Several typical tank hazard situations will be demonstrated.

Electric Motors

The Louis Allis Company, Milwaukee, Wisconsin, has published Bulletin 508E to present recently developed types of electric motors for use in explosive atmospheres.

Threading Machinery

Landis Machine Company, Waynesboro, Pennsylvania, announces the establishment of a mailing list for a new bi-monthly mail-piece "Thread Tips," containing technical information and developments in the field of threading machinery.

Equipment

Browning-Ferris Machinery Company, Dallas, Texas, has prepared a 20-page booklet to illustrate and describe a complete line of oil field and pipe line construction equipment, drilling engines, pumps, and compressors.

Steel Castings

Smith Steel Foundry Company, Milwaukee, Wisconsin, can provide information on latest type stainless alloy steel castings, showing the need and variety of applications for stainless, corrosion resistant small castings.

Valve-in-Head Packer

A new bulletin listing descriptions, illustrations and prices of its products has been issued by Kibele Manufacturing Company of Dallas. Of special interest is the material on the Kibe'e Valve-in-Head Packer, printed for the first time.

Squeaks from the Bull Wheel

Job for a Horse

So you wanna quit us. Don't the wages suit you?

The wages is all right, but I feel guilty fer cheatin' a horse out of a job.

Too Boresome

"Now don't you think you and your husband could live together without fighting all the time?"

"Nosah, Jedge, leastwise we couldn't 'joy ou'selves an' be happy."

"Speed" Has an Idea!

"Is it a-rainin' out?"

"Ah don't know."

"Well, git up an' look."

"Aw, call de dawg in an' see if he's wet."

More Scotch

I wish to rent a horse.

How long?

The longest you've got; there be five of us going.

Family Affair

"If I kiss you, will you call your mother?"

"What do you want to do—kiss the whole family?"

Sweet Sixteen

Nurse, will I have a mustache on my lip like daddy when I grow up?

Pretty often, dear, I expect.

A Long, Long Trail A-Winding

It seems perfectly natural for a road engineer to be in the middle of the road, on his hands and knees. I can't see that such actions prove this man was drunk on the job.

No, sir, that wouldn't prove anything. But this guy was trying to roll up the white line.

Pseudo-Tudor

Said the builder: "This is the house, in the Tudor style."

"I don't care for the Tudor style," declared the prospective purchaser.

"Soon alter that, sir. George, just bring a pail of water and wash out those oak beams."

Service

At two o'clock in the morning a certain lady telephoned the president of a large department store. After much ringing, the mogul answered with a sleepy and gruff "Hello!"

"This is Mrs. Soandso. I just couldn't help calling you personally to tell you that the hat I bought at your store last week is simply stunning. I've been trying it on, and I don't know when I've liked anything so much."

"That's all very nice," yawned the president, "but would you mind telling me, Madam, why you call me this hour of the night about a hat you bought last week?"

"Because," she replied politely, "your truck just delivered it."

Might Help

"No, I just can't stand being kissed."

"That's fine, come over here and sit down."

Sightseeing

"How did you manage to see Rome in three days?"

"Oh, we managed very well—my wife did the churches and the shops, my daughter did the museums, and I did the inns."

Came the Dawn

Wife (at movies)—Is your seat comfortable, dear?

Hubby—Quite, my love.

Wife—And do you have a good view of the picture

Hubby—Perfectly, dear.

Wife—Are you bothered by that awful noise outside the exit?

Hubby—No, darling.

Wife—Then trade seats with me, you selfish little weasel.

Substitute

The African explorer had seen many gnus during the day. In the evening, his native cook served him a delicious steak.

"This is one of the finest steaks I've ever eaten," he exclaimed to his guide. "Is it gnu?"

"No," said the guide, "but it's just as good as gnu."

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GIANT KODIAK BEAR

Most Thrilling Hunt!
WORLD'S LARGEST BEAR

1939 FALL hunts NOW BOOKING! Hunt these world-famous bears for REAL T-H-R-I-L-L-S AND REAL TROPHIES. Finest hunting camps in Alaska. We use hunting cruisers, planes, horses, canoes. Numerous references of successful hunts. WRITE or WIRE for further details, literature and prices TODAY.

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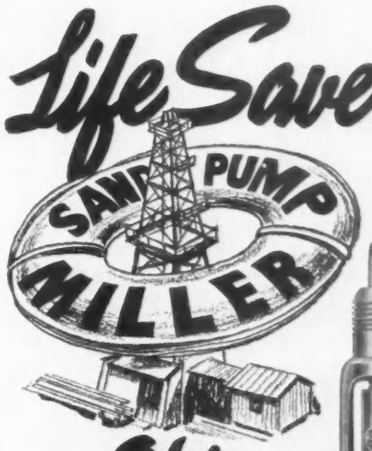
Life Saver



FOR Old WELLS

Throughout the World MILLER Sand Pumps are cleaning-out sand and sediment — *bringing new life,* increasing production in old wells.

The MILLER is made in diameters of 2½, 3, 3½, 4, 4¼, 5, 5½, 7 and 9 inches and lengths of 20, 25 and 30 feet. 5/32-inch wall thickness in REGULAR Type. ¼-inch wall tubes HEAVY Type Sand Pumps.

INTERCHANGEABLE BOTTOMS
To Meet Every Condition

● BAILER BOTTOM
With the Bailer Bottom installed the MILLER is quickly changed to a Bailer giving you a combination of either Bailer or a Sand Pump in one tool.

● SAND BOTTOM
Used when tools are run and when well is shot to quickly remove loose material.

● STAR BOTTOM
Used for cutting the sand loose.

● CHISEL BOTTOM
(In Pump)
With this bottom tightly packed sand can be easily broken in small pieces so it can be picked up in the pump.

Write for Descriptive Folder and Price List

See Pages 1564-65 COMPOSITE CATALOG

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